Journal of the History of Medicine

and Allied Sciences

VOLUME VXIII

1963

CONTENTS OF VOLUME XVIII

January

HENRY SCHUMAN—AN APPRECIATION, *Genevieve Miller* . . 1

GARTH'S HARVEIAN ORATION, *Frank H. Ellis* 8

AUGUST WEISMANN—PERSONAL REMINISCENCES, *Alexander Petrunkevitch* 20

ROBERT WATT: PHYSICIAN AND BIBLIOGRAPHER, *Archibald L. Goodall and Thomas Gibson* 36

A NOTE ON THE EARLY RELATIONSHIP BETWEEN GEORGES CUVIER AND LOUIS AGASSIZ, *William Coleman* 51

HEALTH CONDITIONS IN THE GHETTO OF LODZ, *Leonard Tushnet* 64

REMOVING STONES, *D.J.K.* 74

NOTES AND EVENTS 75

L.R.C. Agnew: Paré's Apophthegm; *Lester S. King:* Hippocrates and Philosophy; Ruben Eriksson, 1895-1962; National Institutes of Health; Historical Gleanings; The Henry Schuman Medical History Prize

BOOK REVIEWS 83

Francisco Guerra. *American Medical Bibliography 1639-1783.* Reviewed by Brooke Hindle 83

Eduard Farber, Ed. *Great Chemists.* Reviewed by George M. Fleck 84

Pierre Huard and Mirko Drazen Grmek, Eds. *Leonardo da Vinci. Dessins Scientifiques et Techniques.* Reviewed by Kenneth D. Keele 85

G. E. W. Wolstenholme and Cecilia M. O'Connor, Eds. *Medical Biology and Etruscan Origins.* Reviewed by Jerry Stannard . . 87

L. Scheler and W. A. Smeaton. *Lavoisier et la Révolution française.* Vol. II. *Le Journal de Fougeroux de Bondaroy.* Reviewed by Rhoda Rappaport 88

J. L. W. Thudichum. *A Treatise on the Chemical Constitution of the Brain [1884] with a new historical introduction by David L. Drabkin.* Reviewed by Edwin Clarke 90

John Q. Anderson. *Louisiana Swamp Doctor: The Life and Writings of Henry Clay Lewis.* Reviewed by Warner Wells . . 90

Sir George Thomson. *The Inspiration of Science.* Reviewed by Burnaby Munson 92

John H. Raach. *A Directory of English Country Physicians, 1603-1643.* Reviewed by Edwin Clarke 93

David A. Kronick. *A History of Scientific and Technical Periodicals: The Origins and Development of the Scientific and Technological Press, 1665-1790.* Reviewed by William K. Beatty . . . 94

Judson Bennett Gilbert. *Disease and Destiny, A Bibliography of Medical References to the Famous. With Additions and an Introduction by Gordon E. Mestler.* Reviewed by Gertrude L. Annan 95

A. Lakshmi Pathi. *A Text-Book of Ayurveda* (Ayurveda Siksha). Vol. I. 2d ed. Reviewed by Martin Levey 97

Suessmann Muntner, Ed. *Moshe ben Maiman's Medical Works.* Vol. III: *Commentary on the Aphorisms of Hippocrates.* Reviewed by Martin Levey 97

Denis Leigh. *The Historical Development of British Psychiatry.* Vol. I. *18th and 19th Century.* Reviewed by George Mora . . 98

Chandler McC. Brooks, Jerome L. Gilbert, Harold A. Levey, and David R. Curtis. *Humors, Hormones, and Neurosecretions. The Origins and Development of Man's Present Knowledge of the Humoral Control of Body Function.* Reviewed by R. H. Follis, Jr. 99

BOOKS RECEIVED 100

NOTES ON CONTRIBUTORS 102

April

THE FIRST EXPERIMENTS ON TRANSFUSION IN FRANCE, *Hebbel E. Hoff and Roger Guillemin* 103

THE DIFFERENT CAREERS OF GUSTAV FRITSCH, *Harry Grundfest* 125

ARISTOTLE ON THE ANATOMY OF THE BRAIN, *Edwin Clarke and Jerry Stannard* 130

ALBERT DEUTSCH: THE HISTORIAN AS SOCIAL REFORMER, *Jeanne L. Brand* 149

PROHIBITION AND EUGENICS 1920-1933, *Bartlett C. Jones* . . 158

"SICK MAN SURROUNDED BY PHYSICIANS, SAINTS, AND DEMONS," *D.J.C.* 173

NOTES AND EVENTS 174

F. R. Jevons: Boerhaave's Teaching in Relation to Beccari's Identification of Gluten as an "Animal" Substance; *Jerome M. Schneck:* Charles Darwin, William Osler and "The Fixed Period"; *L. R. C. Agnew:* Sir Astley Cooper and William Millard—A Vindication; *Howard B. Adelmann:* The "Raid" on Malpighi's Villa a Fiction; Historical Notes in the American Journal of Cardiology; D. J. Davis Lecture; The Red Cross as a Symbol; Edvard Gotfredsen, 1899-1963; Henry Schuman Memorial Lecture; Colonial Manuscripts in the Department of Health and Welfare, Mexico City; Establishment of the Albert Deutsch Memorial Foundation

BOOK REVIEWS 182

S. A. J. Moorat. *Catalogue of Western Manuscripts on Medicine and Science in the Wellcome Historical Medical Library.* Vol. 1. *Manuscripts Written Before 1650 A.D.* Reviewed by Curt F. Bühler 182

F. N. L. Poynter, Ed. *A Catalogue of Printed Books in the Wellcome Historical Medical Library. I. Books Printed Before 1641.* Reviewed by Donald G. Wing 184

William H. Davenport. *The Good Physician.* Reviewed by Saul Jarcho 184

Esmond R. Long. *A History of American Pathology.* Reviewed by Ralph H. Major 186

Herbert Thoms. *Chapters in American Obstetrics.* Reviewed by Claude E. Heaton 187

G. A. Lindeboom. *Boerhaave's Correspondence, Part I.* Reviewed by Joseph Ewan 188

Myrtle Greenfield. *A History of Public Health in New Mexico.* Reviewed by Jeanne L. Brand 189

Nicolas Andry. *Orthopaedie.* Facsimile reproduction. Reviewed by Ulrich H. Weil 190

Eugène Oliver. *Médecine et Santé dans le Pays de Vaud. Des Origines à la Fin du XVII Siècle.* Reviewed by C. D. O'Malley . 191

Félix Martí-Ibáñez. *Ariel. Essays on the Arts and the History and Philosophy of Medicine.* Also *The Epic of Medicine.* Reviewed by Edwin Clarke 193

Walter Müri. *Der Arzt im Altertvm. Griechische und Lateinische Quellenstücke von Hippokrates bis Galen mit der Übertragung ins Deutsche.* Reviewed by Edwin Clarke 194

Claude Bernard and J. J. Izquierdo. *Medicina Experimental.* Reviewed by José M. R. Delgado 194

W. J. Bishop and Sue Goldie. *A Bio-Bibliography of Florence Nightingale.* Reviewed by Anne L. Austin 196

James Gray. *Education for Nursing.* Reviewed by Anne L. Austin 197

Clifford Morson. *St. Peter's Hospital for Stone: 1860-1960.* Reviewed by Clyde L. Deming 198

P. Kutumbiah. *Ancient Indian Medicine.* Reviewed by Martin Levey 199

Joan Bennett. *Sir Thomas Browne;* also Frank Livingstone Huntley. *Sir Thomas Browne: A Biographical and Critical Study.* Reviewed by Robert T. Petersson 206

BOOK NOTICES. By Edwin Clarke 203

K. F. Meyer. *Disinfected Mail.* 203

Charles Clayton Dennie. *A History of Syphilis.* 203

Frederick A. Willius and Thomas E. Keys. *Classics of Cardiology. A Collection of Classic Works on the Heart and Circulation with Comprehensive Biographic Accounts of the Authors.* 203

Russell Brain. *Some Reflections on Genius and Other Essays* . 204

Geoffrey Keynes. *Dr. Timothie Bright, 1550-1615.* 204

BOOKS RECEIVED 205

NOTES ON CONTRIBUTORS 207

July

REPAIR OF CLEFT PALATE BY PHILIBERT ROUX IN 1819. A Translation of John Stephenson's De Velosynthesi, *W. W. Francis* 209

SOCIAL ATTITUDES TO IRRATIONALITY AND MADNESS IN 17TH AND 18TH CENTURY EUROPE, *George Rosen* . . 220

THE MEDICAL HISTORY OF THE FREDERICKSBURG CAMPAIGN: COURSE AND SIGNIFICANCE, *Gordon W. Jones* . 241

RATIONALISM IN EARLY EIGHTEENTH CENTURY MEDICINE, *Lester S. King* 257

FRIEDRICH LOEFFLER AND THE THESSALIAN FIELD MOUSE PLAGUE OF 1892, *Dexter H. Howard* 272

CARICATURE OF DOCTOR AND PATIENT—AFTER MOLIÈRE, *A.H.M.* 282

NOTES AND EVENTS 283

Joshua O. Leibowitz: The Old Age Description in *Ecclesiastes* and its Medical Interpretation by Johann Heinrich Michaelis; *Vern L. Bullough:* The Term "Doctor"; *James E. O'Neill:* Sir Thomas Crawford and "Physical Deterioration" in 1887; Historical Gleanings

BOOK REVIEWS 296

A. R. Hall and Marie Boas Hall. *Unpublished Scientific Papers of Isaac Newton. A Selection from the Portsmouth Collection in the University Library, Cambridge.* Reviewed by Derek T. Whiteside 296

W. A. Smeaton. *Fourcroy: Chemist and Revolutionary 1755-1809;* also Albert B. Costa. *Michel Eugene Chevreul, Pioneer of Organic Chemistry.* Reviewed by George M. Fleck 297

John L. Thornton and R. I. J. Tully. *Scientific Books, Libraries, and Collectors.* 2d ed. Reviewed by Cosmo A. Gordon . . . 299

Harvey Cushing. *A Bio-Bibliography of Andreas Vesalius.* 2d ed. Reviewed by C. D. O'Malley 300

Charles Singer and E. Ashworth Underwood. *A Short History of Medicine.* 2d ed. Reviewed by Lester S. King 301

Herbert Thoms. *Samuel Seabury—Priest and Physician, Bishop of Connecticut.* Reviewed by David Hall 303

George Winston Smith. *Medicines for the Union Army. The United States Army Laboratories during the Civil War.* Reviewed by James Harvey Young 304

Morris Gorlin, Ed. *Maimonides "On Sexual Intercourse."* Reviewed by Martin Levey 305

André Hahn, Paule Dumaitre, and Janine Samion-Contet. *Histoire de la Médecine et du Livre Médical.* Reviewed by Edwin Clarke 306

Erna Lesky. *Österreichisches Gesundheitswesen im Zeitalter des aufgeklärten Absolutismus.* Reviewed by George Rosen . . . 307

Constantino L'Africano. *Della Melancolia.* Reviewed by George Mora 308

L. D. Heaton, J. B. Coates, Jr., and W. P. Havens, Jr. *Medical Department United States Army. Internal Medicine in World War II,* Vol. I. *Activities of Medical Consultants.* Reviewed by Louis H. Nahum 310

BOOK NOTICES

Henry K. Beecher and Charlotte Ford. *A Bibliography of the Publications of the Anaesthesia Laboratory of the Harvard Medical School at the Massachusetts General Hospital.* Reviewed by Nicholas M. Greene 311

Donald E. Konold. *A History of American Medical Ethics, 1847-1912.* Reviewed by Edwin Clarke 312

Ricardo Archila. *Bibliografía Médica Venezolana.* Reviewed by F. Guerra 312

Stephen B. Dewing. *Modern Radiology in Historical Perspective.* Reviewed by Edwin Clarke 313

Kurt Kolle. *Grosse Nervenärzte.* Reviewed by Edwin Clarke . . 313

D. P. Hall. *Our Surgical Heritage.* Reviewed by Edwin Clarke . 314

Robert H. Ivy. *A Link with the Past.* Reviewed by Fred B. Rogers 314

History of Science Society of Japan. *Japanese Studies in the History of Science, No. 1.* Reviewed by Edwin Clarke . . . 315

BOOKS RECEIVED 315

NOTES ON CONTRIBUTORS 317

October

JACQUES LOEB: THE MAN AND HIS TROPISM THEORY OF ANIMAL CONDUCT, *Arnold E. S. Gussin* 321

JOHN GRAUNT, FRANCIS BACON, AND THE ROYAL SOCIETY: THE RECEPTION OF STATISTICS, *Robert Kargon* 337

PODAGRA BY GOTTFRIED ROGG: AN ILLUSTRATED ENCOMIUM ON GOUT, *Thomas G. Benedek and Gerald P. Rodnan* 349

A PROHIBITION PROBLEM: LIQUOR AS MEDICINE 1920-1933, *Bartlett C. Jones* 353

IBN al-WAḤSHĪYA'S "BOOK OF POISONS," *KITAB al-SUMUM*: STUDIES IN THE HISTORY OF ARABIC PHARMACOLOGY II, *Martin Levey* 370

THE DENTIST, *J.B.H.* 378

NOTES AND EVENTS 379

Kenneth F. Russell: George Lindsay's Microscope; *Arthur L. Benton and Robert J. Joynt:* Three Pioneers in the Study of Aphasia; *William Brockbank and Andrew B. Scott:* Peonies, 'Peckers, and Prolapsus Ani; *May G. Hardy and Richard J. Durling:* Baumgartner-Fulton 5: A Corrigendum; Maccabaean Prize and Medal; Dutch Society for the History of Medicine; Dr. George Rosen Appointed Visiting Professor at Yale; American Association for the History of Medicine

BOOK REVIEWS 387

Richard Hunter and Ida Macalpine. *Three Hundred Years of Psychiatry 1535-1860.* Reviewed by Eric T. Carlson 387

W. K. C. Guthrie. *A History of Greek Philosophy,* Vol. 1. Reviewed by Jerry Stannard 388

W. P. D. Wightman. *Science and the Renaissance.* Reviewed by Allen G. Debus 390

Francisco Guerra. *Nicolas Bautista Monardes: Su vida y su obra.* Reviewed by Thomas Herndon 392

Bruno Kisch. *Gewichte- und Waagemacher im Alten Köln (16.-19. Jahrhundert).* Reviewed by Curt Proskauer 393

Akos Palla *et al.,* Eds. *Nymphis Medicis.* Reviewed by Edwin Clarke 394

Vicente Peset. *La Psiquiatría de un Medico humanista: (Francisco Valles, 1524-1592).* Reviewed by F. Guerra 394

Manfred Frey. *Friedrich Miescher-His und sein Beitrag zur Histopathologie des Knochens.* Reviewed by Lowell E. Noland . . 395

Allen O. Whipple. *The Story of Wound Healing and Wound Repair.* Reviewed by Edwin Clarke 396

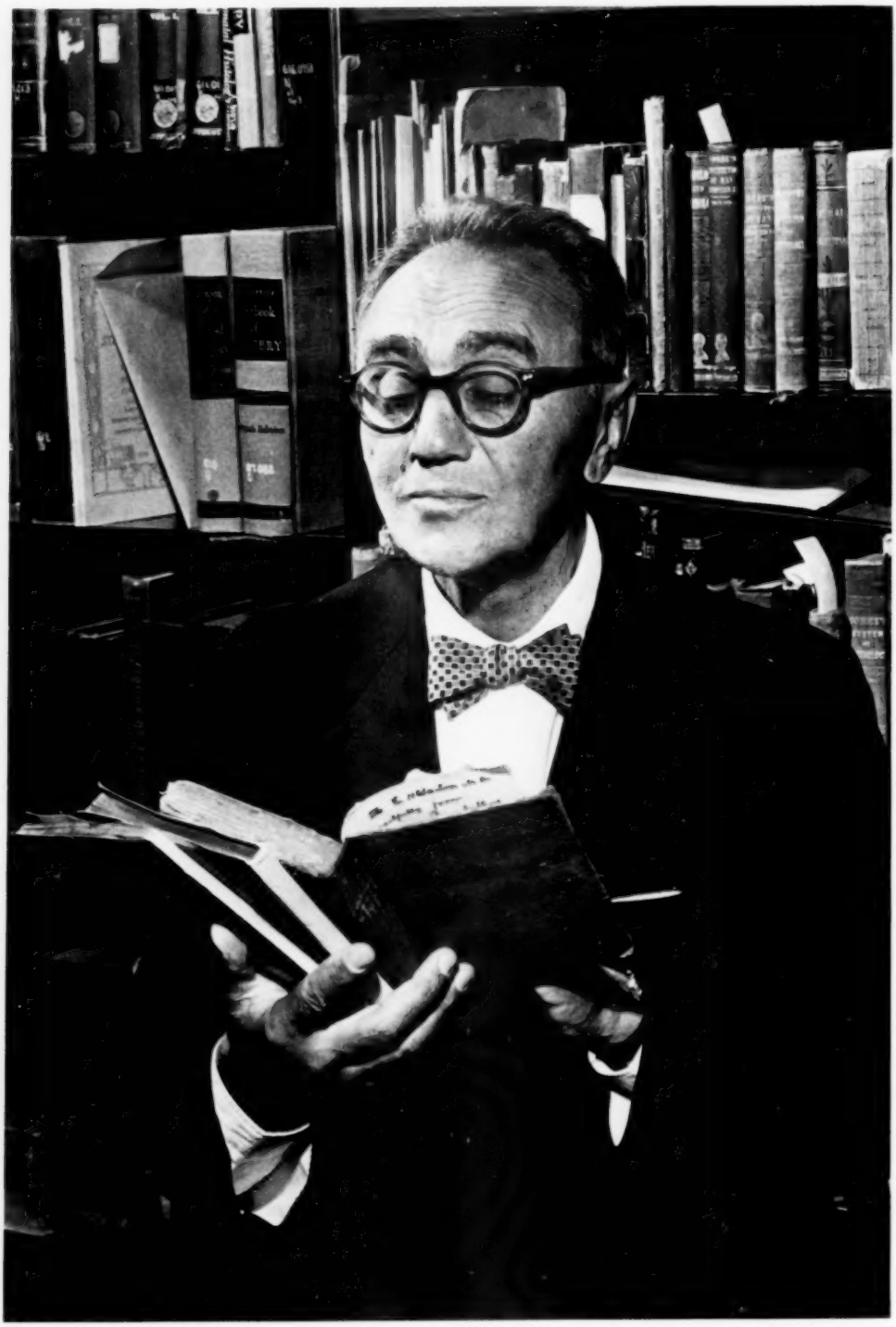
L. R. Lind. *Aldrovandi on Chickens.* Reviewed by Margaret T. May 396

T. Doby. *Discoverers of Blood Circulation. From Aristotle to the Times of Da Vinci and Harvey.* Reviewed by Edwin Clarke . . 499

BOOKS RECEIVED 400

NOTES ON CONTRIBUTORS 401

INDEX 403



With kind permission of Courier-Journal and Louisville Times

HENRY SCHUMAN
1899-1962

Henry Schuman—An Appreciation

GENEVIEVE MILLER*

DURING the past six years we have lost some of the foremost scholars in medical history and the history of science—Sarton, Sigerist, Fulton, Singer, to mention them in their order of passing. All of these men cultivated a new area of knowledge and publicized it as professors and writers. Most recently, on 19 September 1962, we lost a fifth pioneer who in a different way helped to develop interest in medical history and to create centers for its study.

Henry Schuman's name is known to everyone associated in any way with medico-historical work. If he was not known personally, his immaculate catalogues of rare medical works appeared on all desks, tantalizing the collector with an established appetite and pricking the conscience of librarians sensitive to the growing need to build up historical scientific collections. As a publisher and founder of this *Journal,* Schuman widened public awareness of the "new history," the effects of which have become so evident in daily life.

How does one become a medico-historical book dealer and publisher? The routes are many, but that of Henry Schuman was unusual. Born in Russia on 15 May 1899 and brought to the United States several years later, he grew up in Brockton, Massachusetts, and New York City where he attended De Witt Clinton High School. After moving with his parents to Detroit, his early manhood was devoted to various business activities and ultimately to founding a ball-bearing business which suffered reverses during the Depression. Reminiscing later of the time when financial disaster struck, he said, "I knew I was through with the usual type of commerce—or, rather, it was through with me." As a child he had loved to read and was always collecting books; as a successful business man he had collected first editions. In 1930 he turned to his lifelong interest and opened a bookshop, using his own collection of several thousand volumes as a nucleus and specializing in first editions and fine press items.

Among his first customers was the late Lawrence Reynolds, a Detroit radiologist who was building a library of medical classics. Reynolds asked Schuman to procure for him a copy of Laennec's

* Cleveland Medical Library and Western Reserve University School of Medicine, Cleveland, Ohio.

Copyright 1963 by JOURNAL OF THE HISTORY OF MEDICINE AND ALLIED SCIENCES, Inc.

De l'auscultation médiate. In Schuman's successful search for the Laennec, he found his future career. At a time when the newly founded and still undeveloped Institute of the History of Medicine at Johns Hopkins was the only academic center for medico-historical studies in this country, and when there were only a few collectors, among them Harvey Cushing, John Fulton, LeRoy Crummer, Lewis Stephen Pilcher, Henry Barton Jacobs, and Herbert Evans, the new book dealer courageously decided that he would specialize in the history of medicine and science and thus became the first in this country to do so, the "specialists' specialist," as *Time Magazine* once described him. He conscientiously educated himself in the subject matter in order to serve his clients well, and patiently helped to assuage the collector's fever, which Reynolds once described as "a little flushing of the cheeks, a slight exophthalmos and a certain tremor of the fingers in the presence of great books." The first catalogue of rare medical books and classics was issued in Detroit in 1934.

No longer addressing himself to street shoppers, Schuman moved his shop from the ground level to rooms in a downtown Detroit office building which became a cultural retreat for a small group of physicians. The young surgeon, Josiah C. Trent, who interned in 1938 at the Henry Ford Hospital, was introduced by another bookman and joined the group. Trent, whose collection of 4,000 volumes and 2,000 manuscripts now forms the Trent Library of Duke University Medical School, was just beginning to build his library, and Henry Schuman was to be the guiding spirit in its creation.

In 1939 the business was moved to New York, the book business center and his former home, to which Schuman had always wanted to return. At first established in offices in the Heckscher Building, after two years he leased the comfortable five-story brownstone at 20 East 70th Street where books, business, and family all made a delightful ensemble. In Detroit he had married Ida Walerstein, and their two sons, Henry, Jr. and Daniel, who grew up to be a musician and an artist, reflect the creative aesthetic atmosphere of their home. Beginning with the first New York catalogue, issued in the autumn of 1939 in honor of Harvey Cushing's 70th birthday, for over twenty years Schuman continued to present quality items which he uncovered in every imaginable place in the United States and Europe. One story related how he acquired a copy of the first edition of Harvey's *De motu cordis* from a

wealthy lady invalid who was lying in bed drinking whisky, with a bar on one side of her and a vault of rare books on the other.

Even in his early Detroit bookselling years Schuman had been interested in publishing and had issued several literary works by authors then little known, among them Katherine Anne Porter and Sean O'Faolain. One of his first publications with a medical association was a finely printed limited edition of Oliver Wendell Holmes's Phi Beta Kappa Poem *At Dartmouth* which appeared in 1940. In New York he began to publish specialized works in the history of medicine and science, such as C. J. S. Thompson's *The History and Evolution of Surgical Instruments* (1942), George Rosen's *The History of Miners' Diseases* (1943), and Harvey Cushing's *Bio-Bibliography of Andreas Vesalius* (1943).

After the War, in 1946, Schuman founded the *Journal of the History of Medicine and Allied Sciences* to communicate with humanistically inclined physicians who he felt could be interested in medical history as an essential cultural element in their training. With George Rosen as Editor, the Editorial Board and Consulting Editors included well-known scholars from the United States and twenty foreign countries. The *Journal* was supported financially by Schuman until 1951 when it came under the aegis of the Department of the History of Medicine at Yale. In the same year (1946) he formally established a publishing house, Henry Schuman Inc., which was intended primarily to promote interest among the general public in medical and scientific history. The "Life of Science Library" was created as a series of interesting non-technical monographs written by experts with the purpose of informing the lay reader about outstanding individuals and significant events in the scientific past. In seven years 38 titles were published in this series alone. With the same goal in mind, Schuman also initiated two series of juvenile books, "The Story Biography Series" and "Man and His World Series" with titles such as *The City, Water for People, Your Blood and You, Planet Earth, The Moon, The Way of Science,* all intended to teach young people about science, present and past. On two occasions one of his books was listed among the Fifty Best Books of the Year. He was among the first to issue college paperbacks on the history of civilization, believing that history can help one to understand and solve contemporary problems. Altogether 150 books had been issued by Henry Schuman Inc., when the the firm was sold in 1953 because of financial difficulties. Schuman, the publisher, was not able

to survive long enough in a highly competitive market requiring huge capital funds in order to reap the rewards of the current public interest in science and its history which he was among the first to nurture. The failure of the publishing venture was a disappointment. "How many times in the course of a lifetime," he asked John Fulton, "is this cleaning process supposed to take place, I sometimes wonder. What is par for the course?" His regret was not simply for financial loss but because he felt that publishing had given him an opportunity "to function in a way in which I have found more meaning than anything I have ever done before."

When Schuman returned full time in 1954 to the rare book business, which had been resumed by his wife the previous year, he was soon reconciled. "The old work is a bit of fun, at that," he wrote, "working on Cat. I, New Series," and a few days later: "It was an intensive and satisfying task, to finish this first Cat. New Regime—."

Some people who perused the Schuman catalogues with their costly listings and who did not know the man tended to think of him as a business man whose chief aim in life was to make money.

> No such thing as cheap books any more [he wrote characteristically in 1954] but then buyers should keep in mind the price of coffee. Books can be just as stimulating & last longer. [Three years later]: A word, please, about prices, always a bit of an arcana in all antiquarian fields except to those who are practitioners in them, either as buyers or sellers, every day. Pricing, by an established house of conscience and reputation is never arbitrary. The value of a book or manuscript fixed by a seasoned dealer represents his experience of years of dealing, his knowledge of rarity and desirability, his awareness of what is transpiring in the world market. Since the War there has been a sharp inflation in the prices of rare books, occasioned by widely-increased demand not only in America but in Europe and South America, both by libraries and private collectors. For example, in a special little Catalogue I issued in 1939 in honor of Cushing's 70th birthday (he died a few months afterward), I listed a fine copy of the 1543 Vesalius *Fabrica* at $500. Same price for the rare first edition of Boyle's *Sceptical Chymist*. In 1954 when we swung back full time into rare books (after the 7-year publishing seizure), I listed a fine *Fabrica* 1543 for $2100. In doing so I was following the lead of other antiquarians who were pricing this standard rarity from $2000 to $2500. I have since sold two other copies, one (a superb copy) at $2500, to sophisticated buyers.

Henry Schuman was not a business man primarily trying to make money for its own sake. His ultimate goals were equally as altruistic as those of educators. In publishing books and in assisting collectors to build up their libraries he was consciously helping to create the tools and the centers for study and teaching which he

knew would ultimately pass out of private hands. The Freud Collection presented to the Cleveland Medical Library by Dr. Robert M. Stecher is an outstanding example. Two collections for which Schuman was largely responsible were the Lawrence Reynolds Library, now housed in a special wing of the Medical Center of the University of Alabama, and the Trent Library at Duke. For both of these he conscientiously scoured the world to find the right items. His letters to Josiah Trent reveal the extent of his participation in future planning:

> You're right about having the transfusion item in the Lier catalogue. I cabled for it along with 4 or 5 other things. . . . It will be wonderful working with you on building up the Library into the greatest one in private hands this country has known . . . doing a systematic and consistent job. . . . And it means a broad coverage, the valleys as well as the peaks. If you have the notion of making Duke a center for cultural medicine, for making your collection vital and significant, the most effective way is to get a person specially qualified to use and teach the field—a medical historian. . . . Everybody talks now about the humanities but there seems to be money available for everything—buildings, even books, but not for the right kind of human beings who can give meaning to these things.

After Trent had acquired the cornerstone books in medical history, he followed Schuman's advice and concentrated on American medical classics rather than European authors which were already well represented in Northern and Western libraries. The history of anesthesia, of yellow fever, and of the aseptic principle in surgery became focal points, along with extensive manuscript collections of Benjamin Waterhouse, Benjamin Rush, and S. Weir Mitchell. As a close personal friend, Schuman also encouraged Trent to write, and 42 of Trent's 50 published articles were on medico-historical subjects. Simultaneously, Schuman guided the Trents in assembling a Walt Whitman Collection which was also presented to Duke University, Mary Trent having become interested in Whitman during her undergraduate days at Duke.

As an adviser and consultant to Mary Trent after her husband's untimely death in 1948, Schuman assisted in establishing the Trent Library at Duke, helped her to arrange it, to create the "Friends of the Trent Collection," and to find a suitable Curator so that the Library could be developed into a teaching center. All of these plans came to fruition this year, and it is gratifying that the chief architect lived long enough to see their realization. Since Schuman had intimate knowledge of the contents of both the

Reynolds and the Trent Libraries, he was called upon to tell various medical history groups about them. "You mean to say you didn't hear that I was on a regular Chautauqua—Birmingham—Charleston—Durham—Chapel Hill, giving illustrated talks—illustrated by movement of hands, shoulders, eyebrows," he wrote in 1957 with his delightful humor.

Schuman not only collected books but also people. He brought his younger collectors in touch with the medico-historical world of books and personalities. Many of us have enjoyed the surpassing pleasure of an evening with the Schumans and their friends, where a superb dinner *à l'Ida* accompanied by sparkling conversation ranging over all the arts was followed by a string quartet concert in which Schuman played second violin. His violin was one of his chief joys. Having studied for several years as a child, in his forties he found a teacher and practised so diligently that he became a very good second fiddle in his quartet which was composed of skilled musicians. He played regularly on Sunday evenings and as many other times as he could, even while travelling. With the help of the Chamber Music Directory or local friends he would get together groups in Paris or London or Ithaca.

In both happy and unhappy times Schuman was a faithful friend, helping young scholars to get their books published and giving them sound advice. A firm liberal, he supported all who were striving to create a more just economic and social situation. In Durham the Trents were actively against racial discrimination, and when Mary Trent after her husband's death became a Councilwoman in Durham in order to try to contribute to liberal thinking in the South, she had Schuman's constant moral support. The following remark to a non-profit-making scholar is typical: "I note you live over a garage. Well, that's what we in America do with our scholars—over a garage, or in a basement, or a quonset, the while the practitioners, be they doctors, or plumbers, etc. occupy the big house in front."

During the last of several heart-warming visits to Folly Cove on Cape Ann where the Schumans had a charming summer home, our breakfasts were accompanied by our host's recital of French poetry which he read with an admirable accent much praised by French friends who found his "r" quite an achievement for an American. As with his violin, he carefully studied French with a coach and practised reading daily. He liked the classic plays, especially those of Molière. His other reading was mostly related

to his work, never to kill time and rarely for relaxation, except for the detective mystery which he learned to enjoy late in life and only indulged in when he was not feeling well. On most subjects he read only in order to learn more than he knew before. Thus a man with a high school education turned himself into a highly educated individual.

After the original break in his health in October 1959 the last years were spent more quietly but equally productively. In 1961 he prepared two exhibits with carefully annotated catalogues for a special occasion at the Bexar County Medical Library in Texas and for the Duke Symposium "The Commonwealth of Children" in honor of Doctor Wilburt C. Davison. Although he had published over 150 books by other people during his lifetime, his own publications were few and mostly about the Trent and Reynolds collections.

In 1955 he wrote: "I liked your piece *Why Medical History* very much, and your implied plea for the production of the 'educated man' has been, in a way, at the center of my own outlook both subjective and objective, for years. What a battle to stage in these times! What a struggle to wage, when the wages are nearly nil!" He continued by mentioning a similar article by Erwin Ackerknecht who had brought in the point of the "aesthetic appeal of medical history—the beauty of reading about a discovery made" and he, whose entire life was in the service of aesthetics, concluded: "Well, you might say, who in hell's got time for aesthetics?"

> "Maintenant je suis plein de travail et fatigue, moi qui préfère jouer au violin, voir les spectacles, assister aux concerts, traîner au diner avec de la compagnie agréable. Mais vous me connaissez—
>
> A bientôt
>
> H."

ACKNOWLEDGMENTS

Biographical information and personal correspondence were generously supplied by Mrs. Henry Schuman, Mrs. James H. Semans, the widow of Josiah C. Trent, Miss Elizabeth Thomson, and Mrs. Sarah C. Brown, Librarian of the University of Alabama Medical Center. With the exception of the first quotation on p. 1 which was from an article in the *Washington Times-Herald*, 25 August 1948, all of the quotations were from the private correspondence of Schuman with John F. Fulton, Josiah C. Trent, and the author.

Garth's Harveian Oration

FRANK H. ELLIS*

IN July 1656, the year before his death, William Harvey, *medicorum omnium apud Anglos princeps,* completed his benefactions to the College of Physicians in London by endowing a lectureship. On the occasion of a magnificent banquet which he provided for the Faculty, he presented to the College the deeds of conveyance to his hereditary estate at Burmarsh in Kent. Part of the income from this estate Harvey appropriated in very precise terms to the endowment of a public oration in Latin,

> wherein shall be a commemoration of all the benefactors of the said College by name, . . . with an exhortation to others to imitate those benefactors, and to contribute their endeavours for the advancement of the society, according to the example of those benefactors. And with an exhortation to the fellows and members of the said College to search and study out the secrets of nature by way of experiment; and also for the honour of the profession to continue in mutual love and affection among themselves, without which neither the dignity of the College can be preserved, nor yet particular men receive that benefit by their admission into the College which they might expect, ever remembering that *concordiâ res parvae crescunt, discordiâ magnae dilabuntur.*[1]

Never was the founder's wisdom more apparent, nor were the exact terms of the foundation more relevant, than in 1697 when Dr. Samuel Garth was appointed by the president and censors to deliver the Harveian oration. For at this time the College of Physicians was split in two by a controversy over maintaining in the new College building, designed by Sir Christopher Wren, a free out-patient clinic, called a dispensary.

Ten years before this, in July 1687, the College had voted unanimously to "give their advice *gratis* to all their sick neighboring Poor, when desired, within the City of *London,* and seven miles round." A year later, however, the physicians discovered that their charitable intentions had been completely frustrated by the high prices which the charity patients were forced to pay for medicines. Accordingly, in August 1688, the College voted, again unanimously, that "the Laboratory of the College be forthwith fitted up for preparing Medicines for the Poor."[2] These medicines were to be dispensed at cost, and it was here that the College collided with another "Body Corporate and Politic" in the City of London. This body was the Society of the Art and Mystery of Apothecaries, whose royal charter of

* Smith College, Northampton, Massachusetts.

1 William Munk, *The roll of The Royal College of Physicians of London,* 2d ed., 3 vols., 1878, I, 136, III, 360-361.

2 *A short account of the proceedings of The College of Physicians, London, in relation to the sick poor,* 1697, p. 3.

1617 granted *them* the sole right "to sell, set on sale, put forth, or put to sale to any person or persons whatsoever, any compound Medicines, or medicinable Compositions . . . , within the city of *London* and the Suburbs thereof, or within Seven Miles of the same City."[3]

By splitting the ranks within the College of Physicians and playing off one faction against the other, the apothecaries succeeded for nearly ten years in preventing the opening of the dispensary in Warwick Lane. This was only made possible in December 1696 when forty-two members of the College—of a total membership of about one hundred and thirty—contributed £10 each to stock and staff the pharmacy.[4] But many of the most prominent members of the College, including Dr. Edward Tyson, Fellow of the Royal Society and a distinguished anatomist, Dr. John Radcliffe, the most eminent physician of the age, Sir Richard Blackmore, physician-in-ordinary to King William III, Dr. Hugh Chamberlen, the fashionable "Man Midwife," and Dr. William Sydenham, eldest son of Thomas Sydenham, the "English Hippocrates," withheld their support from the dispensary, while many less scrupulous "Apothecaries' Physicians," who augmented their practices by referrals from apothecaries, actively opposed the project.

Never had there been a greater need, therefore, for "remembering that *concordiâ res parvae crescunt, discordiâ magnae dilabuntur.*" And Samuel Garth was undoubtedly appointed to deliver the Harveian oration on 16 September 1697 not because he had "zealously promoted and encouraged the erecting the Dispensary,"[5] but because he could be counted upon to make a skillful and convincing plea for a return to unanimity. In any case, the oration which Garth delivered follows very closely the terms laid down by Harvey. He began with a graceful *exordium* honoring Dr. Thomas Millington, president of the College, and a half-serious disclaimer of his own oratorical abilities which flattered his audience. Instead of exhorting the Faculty "to study out the secrets of nature by way of experiment," however, he next undertook a rather perfunctory "commendation of

[3] C. R. B. Barrett, *The history of The Society of Apothecaries of London*, 1905, pp. xxxi-xxxii.

[4] The number of contributors was later increased to fifty-three. Their names were printed in the second edition (and all subsequent eighteenth century editions) of *The Dispensary*, the mock-heroic poem in six cantos which Garth published in 1699 ridiculing the apothecaries and the "Apothecaries Physicians" who opposed the dispensary. The dispensary itself was finally opened in February 1698, nearly ten years after it had been unanimously voted. It proved so popular that the College opened two branch clinics, one "at the two gilded Spires in *St. Martins Lane*" in Westminster and the other "over against *Frost's* Coffee-House" in Cornhill, to treat the "hundreds" of charity patients who applied each week (*Bellum Medicinale, or The present state of doctors and apothecaries in London*, 1701, p. 44; *The necessity and usefulness of the dispensaries lately set up by The College of Physicians in London*, 1702, p. 84). During the first four years of its operation, the pharmacy dispensed at cost 13,192 prescriptions; during the period February 1701-December 1704, this figure increased to 71,999 (*A short answer to a late book, entituled, Tentamen medicinale*, 1705, pp. 33-34).

[5] "A short account of the life of Sir Samuel Garth, M.D.," *The dispensary*, 11th ed., 1768, p. iv.

Apollo's Art," which "pursues nature through a thousand Windings and Mæanders." But then, after some disturbing remarks on the present state of medicine in England, which allowed quacks and mountebanks to practise openly, he launched into his "commemoration of all the benefactors of the said College by name," beginning with Henry VIII and concluding with Lady Grace Pierrepoint.[6]

It was only in his peroration that he mentioned the dispensary at all, and here he entreated the members, almost in Harvey's words, "to return again to unitie and concord; so all differences amongst us being buried, we may joyntly seek the advantage of our Societie."

More than half the oration, however, is taken up with an extended panegyric of William III and this has puzzled readers unnecessarily. For if the extravagance of Garth's language is disproportionate to the king's patronage of the College of Physicians, it is not disproportionate to his services to his country. This foreigner-king had just brought England to the successful termination of a long and costly war with France. Negotiations with Louis XIV's envoys had begun in April 1697 at Ryswick, William's palace near Delft. There they dragged on all through the summer until finally, on 10 September, the peace was signed. Four days later, when Matthew Prior, secretary to the English mission at Ryswick, brought the good news to London, feelings pent up by eight years of war burst out in a wild celebration. The guns at the Tower were discharged, the flag displayed, bells rung, houses illuminated, bonfires built in the streets, and two triumphal arches prepared "against his majesties arrival."[7] It was against this background, and with these feelings, that Garth wrote his panegyric of the king, who, as Garth admitted, would "rather have [had] his noble actions concealed, than applauded."

Garth's oration was delivered *"to the great satisfaction of the* audience, *and his own* reputation, as the College Register testifies,"[8] and on 27 September the vice-president and censors of the College ordered it to be published. For publication Garth added a graceful dedication to Charles Montague, First Lord of the Treasury and President of the Royal Society, and the small quarto volume was duly published by Abel Roper at the sign of the Black Boy.[9]

[6] Henry VIII granted the College of Physicians its founding charter on 23 September 1518. Lady Grace Pierrepoint gave the College in 1688 books worth £4,000 from the library of her deceased father, the Marquis of Dorchester (William Munk, *The roll of The Royal College of Physicians of London*, 2d ed., 3 vols., 1878, III, 366-367).

[7] Narcissus Luttrell, *A brief historical relation of state affairs*, 6 vols., 1857, IV, 278.

[8] *Biographia Britannica*, 7 vols., 1747-1766, III, 2131.

[9] [within a double rule] ORATIO / LAUDATORIA, / In AEdibus / Collegii Regalis Med. Lond. / 17mo. die Septembris. / [rule] / HABITA / A *SAM. GARTH*, / Col. Reg. Med. Lond. Soc. / [double rule] / *LONDINI*, / Impensis *Abelis Roper*, apud insigne Nigri Pueri, / in vico vulgo vocato *Fleet-street*, MDCXCVII.

Collation: 4°: [A²]B-F². *Contents:* A1r blank; A1v Imprimatur; A2r title-page; A2v blank; B1r dedication; B1v blank; B2r-F1v (pp. 1-16) text; F2 missing. *Copy:* Historical Library, Yale Medical Library. Wing G277 records no copy in America.

One paragraph of the printed Latin version was translated into English in 1750 for inclusion in the article on Garth in the *Biographia Britannica*. The present publication of the entire oration in English was made possible in August 1960 when James M. Osborn presented to the Historical Library, Yale Medical Library, in memory of Dr. John F. Fulton, the late distinguished physiologist and bibliographer of medical history, a manuscript of the oration in English. It was thought at the time that this might prove to be simply an English translation of the published Latin text. It now appears, however, that the published Latin text is a translation of the Osborn manuscript and that the manuscript in turn represents Garth's final draft of the oration in English.

Nor is this conclusion belied by the fact that the Osborn manuscript does not, to an inexpert eye, appear to be in Garth's hand. The most likely supposition is that it was taken down directly from Garth's dictation. But whatever its provenance, it bears unmistakable signs of the act of composition. This is clear from the fact that the corrections made in the manuscript are the kind of stylistic changes made by an author, not the kind of errors made by a copyist. In line 104, for example, in describing Harvey's most celebrated discoveries, Garth deleted the word "discovered" (and substituted "trac'd out") because he realized that he needed it in the next clause, "happily discovered the Circulation of the Blood." He then translated the two clauses into Latin as "ipsissimam animalium originem . . . indagavit, aestum sanguinis feliciter observavit." Similarly, at line 227, in recalling the virtues of the deceased Queen Mary, Garth originally wrote, "than whom none was of a more amiable countenance." But knowing that he wanted to use the phrase "in her countenance" in the next sentence, he deleted "countenance," substituted "features," and then translated the two phrases as *"quâ nulla ore amabilior"* and *"in fronte."*

The manuscript is transcribed below as literally as the limits of typography will admit, except that the common scribal contractions have been expanded and punctuation has been introduced (in square brackets) where necessary to clarify the meaning. Deleted words have been retained in swash brackets (except several letters in lines 227 and 245 which are illegible) to help the reader form his own conclusions concerning the argument in the last two paragraphs. For the same purpose there is provided a specimen of Garth's hand (Fig. 1), a facsimile reproduction of two leaves of the manuscript (Fig. 2), the printed Latin text of the same paragraph (Fig. 3), and the English translation of the same paragraph made in 1750 (Fig. 4).

A Commendatorie Oration made in the {Royal Colled} Publick Hall of the Royal Colledge of Physicians at London the 17th day of September 1697, by Sam. Garth Fellow of the said Colledge.

Most Renowned {President} Vice-president, Learned Fellows, Courteous Auditors: Others may justly admire, why this Province is so unfortunately allotted me, who am neither learned nor eloquent; when so many Orators are here present, famous both for {Ingenuity} Wit and Rhetorick: But this, howsoever you term it, whether Honour or duty, was neither Sought for by me, nor undertaken with any inclination on my part; but when the President commanded me, I esteemed it a Crime to oppose him, and therefore determined rather to hazard my Reputation, than neglect my duty; least I should seem to contemn his Authority, whose sole exhortation is to be complyed with. Neither would it repent me of my undertaking, if I could but imitate so excellent a person, whose very Words are Charms. He calms the temper of others with his own Sweetnesse, he teacheth with ingenuity, moves with Arguments and delights with variety; Moreover he excells in the {nervous brevity} Concisenesse of Salust, in the Sharpnesse of Curtius, and, when he pleaseth in the {Copiousness} Fluencie of Tully. Let none therefore think to give Millington his due praises, who is not his equal in {Wit} learning and elocution; how unfit and foolish therefore I've been, this dayes discourse will abundantly discover.

I'm very sensible, that I want taking words and a persuasive Facultie; I know neither how to speak {briefly, nor fluently succinctly} compendiously nor copiously: my Invention is bare and barren, and my Gesture rude and disorderly. What shall I do then in your presence, how shall I speak any thing beseeming our Art?

You know very well that Alexander the great (to passe by Zoroaster[,] Mithridates[,] Lysimachus and others) applyed himself unto Physick and that by the advice of the *Stagyrite. And no wonder when venerable antiquity accounted many skilfull in this Art not only worthy of Priviledges, Rewards, Statues, but even of a Religious Respect, and almost divine worship. For Men can no way become more like to God, than in giveing[,] preserveing and restoring health.

*Aristotle

Physick extinguisheth the rageing Flame of Fevers, strengthens the trembling and paralytic Limbs with its favourable

Fires, dries up the fountain of a dropsie, stops the running of the Reines, beautifies the face disguised by sicknesse, takeing of[f] the mask and {restoring the} giveing a good complexion: It restores the consumptive, reduceth the Corpulent, chears up the Dull and gives sleep to the restlesse. It describes and distinguisheth the shapes and Tastes of an infinite number of Plants, it searcheth into the very Marrow of Mines, it pursues nature through a thousand Windings and Mæanders; the very Center of the Earth escapes it not, neither is there any thing in the Ocean hid from it.

I might speak much more in the commendation of *Apollo's Art, which I purposely omit, least that I should seem only to repeat what hath been so lately spoken here upon the same occasion. But those who would be better informed of the dignitie and character of Physicians may be pleased to consult Foesius and others. But we are faln into those times and places in which Physick it self is grown sick. This Art most profitable unto others, scarce knows now how to preserve it self, whilst England suffers more by Quacks than distempers. How many and of what sort of these are, the Bills upon every Poste dayly gives you notice. Here you shall have a vagabond sitting on horse back in the Streets, pretending to draw Teeth; At an hour appointed you may have this same fellow at this chamber ready to serve such fools as will come to him; Another looks into his Urinal and there either finds, or makes your disease; A third, {by} haveing gathered a company together by the help of a Rope dancer, strutts and looks great, when happily down falls Tom Tumbler upon the gazeing croud and harms more than ever his Master cured. But this Troop of Cheats wounds not with Weapons, but with {more} a certain more destructive *Theriac Medicine; they {kill} contend not {with} by Fire—but some forreign powders, they kill not with Bullets, but with Pills as fatal. O! the worst of Mankind! These Homicides {are} invade this Citty, with an impunitie equal to their own ignorance; Now as formerly Impudence takes place of Modesty, Stupidity of ingenuity, Injustice of integritie. King Henry the 8th of blessed Memory, to prevent this Pest and provide for his Subjects Health, granted unto this Colledge great priviledges for the governing such as practice Physick here, and preserving what appertains thereunto. After the Example of King Henry,

*Physick

* Medicines made of serpents or other corrosive poysons.

Edward the 6th[,] Queen Mary and Elizabeth, King James and the two Charles spar'd no Kindnesse that might tend to our advantage: Moreover we are much obliged to the Ladyes Mary and Arabella Steward {of} both of Royal extraction; Much also to my Lord Lumley, a man of great authoritie in his time; No lesse to the Marquesse of Dor{set}chester[,] a Fellow of this Royal Colledge, the endowments of whose Mind was as great as his Birth. Neither can we forget those other Ornaments of our Societie, Linacar, Atkins, Read, Meverel[,] Fox, Gulston, Paget, Bidgod, Paman, and more especially Harvey and Hamey: both of them men of great vertue and learning, but somewhat differing in disposition: Harvey was in repute for bounty, Hamey for his plain integritie: He [Harvey] was approved of for a facetious Courteousnesse; To this [Hamey] a solemn gravitie {contributed much to his} added dignitie; The Lenitie of this and Stabilitie of the other is famous.

How much Harvey is to be valued, Europe may learn not from our Mouths only, but his own Writings. The Memory of that blessed Old man dayly revives, than whom no Age ever saw, nor perhaps ever will see one more learned; whose Sharpnesse of Wit and brightnesse of mind, as a light darted from heaven, has illuminated the whole learned world. He has doom'd to utter darknesse Falshoods formerly received {for Truths} for Truths; and has brought to light latent and concealed Verities; I know not whether it was with greater industry or Sagacity, that he {discovered} trac'd out the very Origine of Living Creatures; and {he} happily discovered the Circulation of the Blood; Nothing was conceal'd from him, none more Studious of vertue and veritie; Such was his Bounty, that he knew nothing that he was not willing to communicate to others; Such was his learning, that none ever knew what he was ignorant of: add to these, the chearfulnesse of his countenance, the candor of his expressions, the comelinesse of his conversation: He excell'd in Civility towards his Fellows, in constancy towards his friends, in Justice towards all. Like to the heavenly Inhabitants[,] stood need to few, but was beneficial to very many, even to posterity, not only by teaching them divine Truths, but by makeing us all Heires of what he Left.

Hamey not much otherwise. It[']s the the effect of his Bounty that this Colledge is yet to the fore; few, I think, but they know with how great cost he preserved this Building from the rage of the Civil Warr. It was his desire rather to be than

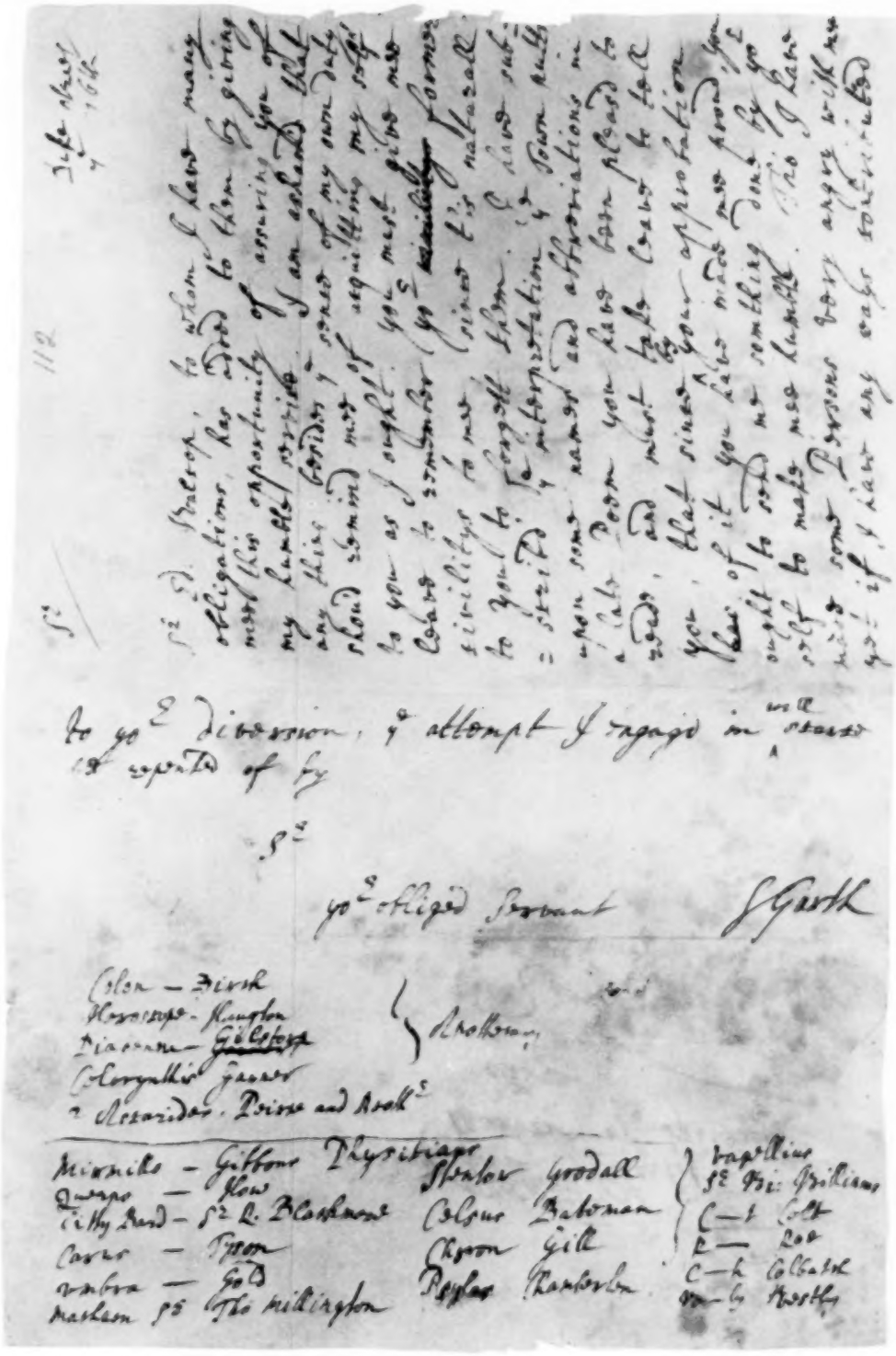


Fig. 1. A reproduction of Garth's letter to Dr. Arthur Charlett, Master of University College, Oxford, identifying the characters in *The Dispensary*. This letter, published in *Letters Written by Eminent Persons in the 17th and 18th Centuries* (1813, 2 vols., I, 114-115) from the manuscript in the Bodleian (Ballard XXIV, f. 68.), is signed "S. Garth" but undated. It was probably written in 1700.

I might Spick much more in the commendation of Physick
Physick Apollo's Art, w^ch I purposely omit, least that I should
seem only to repeat what hath been so lately Spoken by
the same occasion. But those who would be better informed
of the dignity and character of Physicians may be pleased
to consult Fasius and others. But we are fain in these
times and places in w^ch Physick is left of by grown sick. This
Art most profitable unto others scarce knows how to pay
it self, whilst England suffers more by Quacks than by
Empiricks. How many and what sort they are, the Bills upon
every Poste daily gives you notice. Here you shall have a
Jugglor sitting on horse back in the Streets, pretending to
draw Teeth; At an hour appointed you may have the same
fellow at his chamber ready to shew such tools as will come
to him; Another looks into his Water & neither with

finds, or makes your disease. A third by hearing gathers a com-
together by the help of a Rope-dancer, Stalks and looks great
when happily down falls Tom Tumbler upon the gazing crowd
and harms more than ever his master cured. But this troop of
Cheats wounds not with weapons, but with more certain
Medicines made of Serpents & other common poysons / more destructive Theriac Medicines they kill
not with by Fire — but some
Foreign powders, they kill not with Bullets, but
with Pills as fatal. Of the worst of Mankind. These Homicides
are invade this City with an impudence equal to their own
ignorance; Now of formerly Impudence took place of Modesty
Stupidity of ingenuity, Injustice of integrity. King Henry
the 8th of blessed memory, to prevent this Pest & provide for
his Subjects Health, granted unto this College great priviledges
for the governing such as practice Physick here, and punishing
what appertains thereunto. After the example of K. Henry,
the 6th Queen Mary & Elizabeth, K. James and the two Charles's
Spared no Kindness that might tend to the advancement thereof
we are much obliged to the Ladyes Mary & Arabella Stuards of
both of Royal extraction; much also to the Lord Lumley, a man
of great authority in his time; No less to the Marquesses, Lord
a Fellow of this Royal College, the ornament only of whose birth
was great as his Birth. Neither can we forget those other
Ornaments of our Society, Linacar, Atkins, Read, Mercrel
Knox, Culston, Paget, Bidgod, Paman, and more especially
Harvey and Harney: both of them men of great virtue and
learning, but somewhat differing in disposition: Harvey was
irritable for bounty, Harney for his plain integrity. He
was approved of for a facetious Courtesy. To this a solemn
gravity added much to the dignity; The sensible of these
stabilities of the other is lamented.

Fig. 2. A reproduction of one paragraph, lines 46 to 90, of the Osborn MS. in the Yale Historical Library, ff. lv-2r.

Plura dicerem ut artis Apollineæ laudibus nequaquam deeſſem, verùm iſta omitto, ne multa hac occaſione non ita pridem audita recenſere videar. De medicorum itaque dignitate & titulis, qui certiores fieri velint, *Foeſium* & alios conſulant. Sed in ea nos incidimus loca & tempora, quibus ipſa ægrotat medicina. Ars ſiquidem omnibus aliis utiliſſima, ſibi ſuiſque prodeſſe neſcit, dùm plus Pſeudo-medicis quam morbis laborat Anglia. Quot & quales ſint iſti, programmata parietibus affixa monent indies. Hic circumforaneus in plateis equo inſidens, dentes evellit; Ille, domi certis horis fatuos expectat; Alter Matulas inſpicit, & ubi morbum non invenit, facit; Alter, turbâ in unum Funambuli ope convocatâ, venit, videt, in confertiſſimam catervam irruit, & horrendam edit ſtragem. Non autem telis vulnerat iſta Agyrtarum colluvies, ſed Theriacâ quadam magis perniciosâ, non pyrio, ſed pulvere neſcio quo exotico certat, non globulis plumbeis, ſed pilulis æque lethalibus interficit. O genus hominum, ſi quod aliud ſceleratiſſimum! totam urbem invadunt iſti Homicidæ, ſed an imperitiâ an impunitate majori incertum; pro pudore, audacia, pro ſagacitate inſcitia, pro integritate improbitas hodiè, ut olim, viget. Huic peſti ut occurreret *Henricus* octavus regum auguſtiſſimus, & ſanitati ſubditorum religiosè conſulens, Collegium hoc quamplurimis immunitatibus ad rem medicam moderandam ſtabiliendamque dónavit. *Henrici* ad exemplum *Edvardus* ſextus, *Maria* & *Eliſabetha* Reginæ, *Jacobi*, *Carolique* duo, nullum officii genus ad emolumentum noſtrum ſpectans, omiſere: Multa inſuper *Mariæ* & *Arabellæ Stuartæ* ex regio ſanguine oriundis debemus; *Lumleio* Baroni, ſummæ, eo tempore, authoritatis etiam multa; Nec minora Marchioni *Dorceſtriæ*, Collegii hujuſce regalis Socio, viro etiam animi dotibus quàm natalium ſplendore clariori. Neque nos fugiant Societatis noſtræ & alia ornamenta, *Linacrus* nempe *Atkinſius*, *Readus*, *Meverellus*, *Foxus*, *Gulſtonus*, *Pagettus*, *Bidgodſius*, *Pamaynus*, præcipuè vero *Harvæus* & *Hamæus*: ingenti virtute & doctrinâ fuere ambo, ſed indole paulum diversâ: *Harvæus* benignitate clarus habebatur, Morum ſimplicitate *Hamæus*: Ille humanitate feſtivâ probatus fuit, Huic auguſta gravitas dignitatem dedit; Alterius lenitas, alterius ſtabilitas celebratur.

Fig. 3. A reproduction of the paragraph in Figure 2, from the printed Latin version, *Oratio Laudatoria*, 1697, pp. 3-5.

Which has been tranſlated thus,

'More I might ſay, as there is no want of materials, in commending Apollo's art; but I omit them, that I might not ſeem on this occaſion to affect delivering ſuch things as were not ſufficiently known before. Of the dignity and titles of Phyſicians, let thoſe who would know more conſult Foeſius and others. But at preſent, let us ſpeak of places and times in which medicine itſelf is ſick. This art, of all others the moſt uſeful, knows not how to help itſelf; while rather from mock Phyſicians, than diſeaſes, this country ſuffers. What, and what ſort of people they are, the rubrick'd walls at the corner of every ſtreet will inform you. Here an Operator, mounted on his pyed horſe, draws teeth in the ſtreets; another is ſo obliging, as to be at home at certain hours to receive fools; another pores in urinals, and if he finds no diſeaſe there, he makes it; another ſtill, draws together a crowd by the help of rope-dancing; he comes, he ſees, then ruſhes forth upon the multitude, and murders without mercy. Yet not with weapons do theſe ſwarms of mountebanks inflict wounds, but with ſome noſtrum more dangerous than any weapon; not with plain gun-powder, but with ſome ſtrange foreign duſt they charge their packets; not with leaden bullets, but with pills as mortal, they do their buſineſs. O race of men, of all others the moſt wicked! thro' the whole city theſe homicides ſpread their terror, whether with more ignorance or impunity it is hard to determine; inſtead of modeſty, impudence; inſtead of ſagacity, ſtupidity; inſtead of integrity, wickedneſs; now, as of old, flouriſhes. To check this plague, Henry VIII, a moſt auguſt Prince, and religiouſly tender of the health of his ſubjects, eſtabliſhed this College, and fortified it with many privileges, that it might regulate and preſerve the art of Phyſick. Moved by the example of Henry, Edward VI, the Queens Mary and Elizabeth, James, and both the Charles's, omitted nothing that might prove beneficial to the Faculty; much alſo we owe to Mary and Arabella Stuart, whoſe veins were enriched with royal blood; much to the Lord Lumley, in his time a perſon of great authority; nor leſs to the Marquis of Dorcheſter, himſelf a Fellow of this Royal College, and a man ſtill more diſtinguiſhed by the virtues of his mind than by the ſplendour of his birth. Neither are we to ſeek for many other ornaments in this our Society, ſuch as Linacre, Atkins, Read, Meverel, Fox, Gulſton, Pagett, Bidgod, Paman; but above all, Harvey and Hames, both of great virtue and learning, but of different diſpoſitions, Harvey diſtinguiſhed by benignity of mind, Hames by ſimplicity of manners; the former was endeared to all by his chearful humanity, the latter attracted reſpect by a becoming gravity; the one juſtly celebrated for his lenity, as the other for his firmneſs.'

Fig. 4. A reproduction of the paragraph in Figures 2 and 3, translated back into English, in *Biographia Britannica* (1747-1766, 7 vols., III, 2131n).

seem to be bountifull. Some {desire} covet Offices, some Estates, some honour, some other things. His care was for nothing but to enjoy a sound mind in a sound body; whose friendship whilst he lived was[,] and memory now he's dead is[,] most dear to us and respected by us.

Neither may I here omit Baron Cutler. If I should pass him over in Silence, these Walls, these Benches would reprove me. A man neither covetous of what belong'd to others, nor prodigal of his own; he desired honest things, and avoided that which was ill gotten; he denyed himself much, that he might give more to others; he half starv'd himself with hunger and cold, that he might refresh the Poor with food and feuel; he took care of the publick good, and in the interim neglected not his own private {concerns} Interest; Its not meet for me to speak more {of} and I cannot justly speak lesse of him: He left one daughter that surviv'd him but a short while; she was endowed with the best embellishments of the mind, and married to the illustrious Earl of Radnor, of an eminent Family, but more eminent for vertue.

There remains also some Benefactors yet living, as Madam Grace Pierrepoint[,] a most noble heiresse of a noble paternal dowry: Henry Guy Esqr.[,] a man of no lesse courteous than bountifull Temper, who with Sir William Langham and Sir John Banks[,] are worthy to be honourably mentioned, being of approved integritie and prudence.

Dread Soveraign King William, the most invincible of Princes: unto your Sacred Majestie we presume {at last} now to addresse our selves instead of a Conclusion. You are not only the Guardian of This Colledge, but the deliverer of the Christian world and the Restorer of publick Peace. From you it is, that Europe expects better times; from you it is, that the Husbandman hopes for joyfull Seasons; from you it is, that Matrons are in a capacity to defend their chastity, and Maids to maintain their modesty. The English reverence{th} you, the Spaniards respect you, the Germans admire you, the Dutch love you, the French fear you. If we look back to the noble actions of your Ancestors, or to the antiquity of your family, what doth not the Annals of the Antient speak of them? We may reckon as many Hero's and Princes descended from the house of Nassau, as others can reckon men descended from theirs.

There's none, except the wilfully ignorant, but they know, that twenty years and more {the} since, the French forces were

dreadfull to all Europe. For disuse of War breeds sloath, and sloath servitude, so that the publick liberty was dispaired of, untill the Young Prince of Orange, in imitation of his Ancestors, hasten'd to prevent the growing distemper, {after the}[.] What and how many almost miraculous exploits you performed in Flanders, the Battel of Mons amongst others, will bear witness, where you gave the Enemy a fatal overthrow, where you equall'd the Military Conduct of Julius, before you attain'd to the Age of Alexander. You Triumph'd before you came to mans estate.

Again England languishing and haveing her publick safety shaken[,] courted you a fresh to be her Saviour, and into your bossom fled for shelter; It was not your Ambition but our necessitie that made you King here: by your bare presence you restored great Brittain {decaying} declining and almost ruined, by your presence you revived Ireland even exanimated. If I could forget the Instances of your eminent valour, the River of Boyne would remind me. That lingring River almost lost its Channel to yeild you passage; you lead your forces {of} over the River, then putts them in Batalio and {in} things succeed according to your desire; you stand undaunt'd at the head of your Army, and after a short dispute your Enemies provide for themselves by Flight, not being able to oppose your strength, though first possessed of the most advantagious ground. When they fly[,] you pursue, and where ever you go, victory accompanies you.

No Passage how difficult soever obstructs your Troops; the Mountains fall down, Rivers drie up, Gates fly open and the whole Island yeilds to your Arms. Haveing thus subdued the Rapperees and French here, you are called, where the Fates and your own Glory draw you; you again visit Flanders laid waste by Fire, over run by the fury of the French, you promise them your patronage, and bountifully succours their sinking state. You {approach} go against Namur, your Souldiers follow where you command and beseige it. The French flout your enterprise, being so confident in their forces and fortifications. Our country men {being} mindfull of their antient valour, storm it fiercely, and takes the {strongest} best fortified Castle in Europe, you being their General, and the whole French Army their Witnesses.

If I had not mentioned, what and how great that day was, the Columns, the triumphal Archs, the Obelises would speak it in short. Is there any thing, Great Sir, that you have not

attempted for the publick good? You swim with Cocles, you delay with Fabius, and with Manlius your self alone withstands a Troop. You are not puffed up by prosperity above what {see} may seem suitable to your Majestie, neither dejected by adversity; But if you should be forsaken by your men in the field, when you could not withstand the joynt force of your enemies, with an even and valiant mind, you would encounter them one by one. You have chearfully endured unseasonable Wether, the Violence of Wind, Rageing of the Sea, drought of Summer and Cold of Winter. As you are the first in the Battel so you are the last that leaves the field.

May kind Heavens take more care of you, than you do of your Self, lest by being too bold, you prove cruel to those you have hitherto preserved; especially seeing that the safety of so many people and security of several Princes seems to depend upon your sole valour and prudence {alone.} If you comand us to be, we are happy: You do not as other Kings oppress, but advance your Subjects; neither do you take greater Liberty to your Self, than you allow to all. You are the only conqueror of your self. You, alas! it was manifest that you could overcome your self upon a dolefull occasion, when your {dear} Royal consort Queen Mary departed this Life, than whom none was of a more amiable {countenance fea } features or sweeter disposition. Majesty appeared in her Gesture, Candour in her countenance; pleasantnesse, and whatsoever else could procure either Love or Reverence, in her eyes. If Octavius Augustus boasted of his Livia, if Germanicus of Agrippina; and Trajan of Plotina; what may not all of us Speak in the commendation of our Heroesse? but the many weeping Eyes of late did {forcibly} more forcibly declare her celestial virtues.

Our great King William, even you yourself could not refrain from Tears upon that Day; but after you had shown your self a most loveing husband, you then again remembered that you were a Prince. You re-assumed the care of great Brittain and alone undertook publick Businesse; You honour our Country by your Example, as well as defends it by {the} your Sword.

Let not any admire that I know not how to make an end of commending, when you know no end of doing wonders; but in this they are lesse wonders, because yours. You found our Coyn clipp'd and embas'd; may you (after a long Life) leave it {pure and g } in the State you have restor'd it to.

{The English now aspire after nothing but victory, their Prince being their General.} The Britains[,] before your comeing Raw and unexperienced, now aspire after nothing but victory[;] their Prince being their General, they fear nothing now but dishonour. The Day would fail me, before I could recount all your Exploits. Nay he that would reckon them all, had need have the Years that you deserve.

Such things are feigned of Hercules, of Scipio, of Marcellus, but even greater things of you are certain Truths. Verily your fame has diffused it self so far, is so celebrated in forraign Nations, that the Great Czar of Muscovy, an Emulator of your mighty actions, a Reverencer of your Name, is come from the utmost parts of the North to visit you. Chusing rather to be your Guest, and an admirer of your Heroic vertue, than to exercise his own Imperial Dignitie, and at Home triumph for his Victories obtained over the Turks and Tartars; and afterwards, when you as another Prometheus, have animated him with celestial fire, he[,] inspired with your Genius, replenished with your Zeal, shall returne home to fulfill the Wishes and predictions of the Greeks, by enterprizeing the Eastern Empire.

In the interim these Kingdoms flourish even unto envy under your Authoritie, who has approved your self to be the best of Kings and Chief of Generals. Moreover the rest of Europe, yea and even France it self spoiled by a tedious Warr, send Ambassadors to your Majestie and desire an end of their calamities. You listening to their Intreaties has, as Jupiter of Old, quieted the World with a Nod.

Now variance ceaseth, now Arms gather rust, now returns the golden Age as formerly. The Citizens are secure, and the Country men fears not the incursion of Enemies. Let them put an end to all Complaints, and unanimously prepare you Trophees against you returne home, sitting in your Coach of State, adorned with Spoiles, your Coat embroidered with Palms, clad with Purple, crowned with laurel, a company of Captives comeing {bring} behind; your Kingdoms are impatient for you; Let us returne you publick Thanks now that France is confin'd to its own limits, Spain freed[,] Holland secured, and the Germane Eagles Spreading their Wings over the utmost bounds of Hungarie. Let us gratefully acknowledge you the vindicator, You the defender[,] You the Preserver of Europe. Neither must the French boast that {he} their King has given that Peace, which he

has obtained by the Restitution of so many Cities, so many Provinces; Lewis the 14th buys his Peace; its the Great King William, yea and he the most Christian too, that has given Peace to the Christian World.

I can scarce stop here, but seeing our excellent Prince had rather have his noble actions concealed, than applauded and is sufficiently famous by his own virtues, without others just commendations, I will leave this Head; and become an humble Suitor unto all of you that are Fellows of this Colledge, that {the} seeing the most bountifull Monarch of the whole world has undertaken the Patronage of this our Royal Colledge, let us attempt some thing suitable to so great a Patron. I propound unto you the example of the best and most learned President, and of many others of this Society who are here present; For they share with others in their Calamities and Necessities. They have provided a Repositorie well furnished with Druggs for the help of the Poor. If therefore so great Pietie, so much Charitie may be of force to move you, if not in other things, yet in this I beseech you be conformable; unlesse things {to} be come to this passe, that our keenest enemies are to be found at home. If Statutes, if Solemn Oaths are vain names, yet how ever 'tis your Interest as Fellowes of this Colledge, {lest} that they learn not to contemn your Authoritie, who ought to obey you, but that the Priviledges you have received from your Ancestors, may be left by you to Posterity. {Again} Therefore I earnestly intreat you to return again to unitie and concord; so all differences amongst us being buried, we may joyntly seek the advantage of our Societie.

The thing it self, the time and necessitie exhort you more than my oration. Are we not come to that passe that we fear those unto whom we ought to be a terror; unto whom all is fish that comes to their Net; who haveing neither Learning nor good Manners, but a Stock of confidence[,] attempt to Subvert this Fabrick; Who take it ill, that we are well: but though they be more happy by our Divisions than their own conduct: let them know that wee'l watch more vigilantly for the Safety of this Colledge and the people, than for their ruine. In the mean Season[,] You my Fellows! (let them do what they list) I pray you let us be mindful for the future of former promises. I could speak more if words had any weight with the pertinacious; to the ingenuous I think I have spoken too much.

Finis.

August Weismann

Personal Reminiscences*

ALEXANDER PETRUNKEVITCH**

WEISMANN died on 5 November 1914, shortly after the outbreak of the First World War, and this circumstance prevented worldwide public recognition of the passing of this great zoologist whose theory of the continuity of the germ plasm and noninheritance of acquired characters became the cornerstone of the modern science of genetics. A list of Weismann's publications was given in the Report printed in 1904† on the occasion of the celebration of his 70th birthday. There is, therefore, no need in reprinting the whole list here, but since the Report is not easily available in American libraries and for the benefit of those who are not familiar with some important phases of Weismann's life, the dates of a few of his outstanding publications will be mentioned, because they throw light on the otherwise not easily visible trends in the development of his character and in the progress of his scientific investigations and theoretical concepts. This is also necessary for the understanding of the great admiration of his associates and students for the integrity of his purposes, his sustained interest in the work of his opponents, his patient disregard of their unjust criticism, and his persistent attempts to eliminate inconsistencies between the fundamental principles of his theories and newly discovered facts which seemed to contradict them and which were arraigned against them by his critics. It was this constant, persistent and anxious search for truth, which caused most of his contemporary adversaries to attribute to him a mind full of vacillation, incapable of reaching final conclusions which would give his theories the shape and strength of a harmonious structure.

Weismann was born on 17 January 1834 in Frankfurt am Main. His early interest in nature was enhanced by his music

* Read at a Colloquium of the Department of the History of Science and Medicine, Yale University School of Medicine, on 8 February 1962.

** Professor Emeritus of Zoology, Yale University.

† Bericht über die Feier des 70.Geburtstages von August Weismann am 17.Januar 1904 in Freiburg i.Breisgau. Herausgegeben von dem Comite zur Stiftung der Weismann-Büste. Jena, 1904. (The Report is 45 pages long, includes several speeches and Weismann's replies to them, in the last of which he gives a short account of his early training and the attacks of blindness. It also includes a plate with a photograph of the bust made by the sculptor Joseph Kowarzik and a snapshot which is an excellent likeness of Weismann, made by Georg von Guaita.)

teacher Heymann, who knew a great deal about butterflies and taught the ten-year-old boy to identify many common species and to mount them properly in boxes. The influence of this early teacher was so great that music and butterflies remained Weismann's two hobbies throughout his life. His office was filled with innumerable boxes of domestic, foreign, and experimentally reared butterflies, a collection which was constantly taken care of by his devoted caretaker of the laboratory building, who was proud to help his considerate and nearly blind master. And in the parlor of his home, Weismann had a beautiful grand piano on which in his hours of leisure he played classical music with the skill of an accomplished musician. Occasionally he did so after a dinner party to entertain his student dinner guests.

Weismann began his scientific career as a student of medicine at the University of Göttingen, where he was given the degree of Doctor of Medicine in 1856 for his paper on the origin of hippuric acid in the urine of herbivores, published as a prize dissertation in 1857. His second paper, for which he also received a prize, was published in 1858. It concerned itself with the content of salt in the water of the Baltic Sea ("Ostsee") and represented a year's work in the University of Rostock, where he was employed as assistant in chemistry to Franz Schulze. In 1859 Weismann returned to Frankfurt as a practising physician but was sent the same year as a Red Cross doctor to Italy where he had the opportunity of visiting several cities. Next year he studied zoology in Paris at the Jardin des Plantes and then in Giessen under the distingushed zoologist Leuckart. In 1861 he accepted the position of family physician to the Austrian Archduke Stephan in his palace in Schaumburg. During the two years of this service Weismann continued his studies, resulting in the publication of several papers on muscular tissue, including his discovery of the branched type of muscular cells of the heart. In 1863 he published his celebrated discovery of the imaginal discs in the development of insects, for which he coined the term universally used since that time in translations, equivalent to his German "Imaginalscheibe." On the strength of this work he was appointed Privat Dozent of Zoology in the University of Freiburg in Breisgau. A year later, in 1864, while working at his microscope Weismann was suddenly afflicted with a rare disease of the retina in his left eye, which made all scientific work and even reading impossible, so that from then on for ten long years he had to depend entirely upon

the help of his loving wife who patiently read aloud to him the current scientific journals and books and supervised the publication of his own papers. It was during this time that Weismann wrote his first paper on Darwin's theory of natural selection and began his own studies of the problems of evolution. Slowly, under the influence of rest his eyesight began to improve. Having recovered it completely in 1874, Weismann plunged again into microscopic work and published a series of papers, culminating in his monumental two-volume investigation dealing with the problem of the origin of the sexual cells in Hydromedusae (1883). At the same time and in the same year he published two short, theoretical essays, one on heredity and the other on the immortality of life. In 1884 his paper "On Life and Death" was published, in which for the first time he gave an outline of his theory of the continuity of the germ plasm.

In the same year (1884) Weismann was for a second time suddenly afflicted with blindness of the left eye, even more seriously than before. Once more all scientific work and reading became impossible. He still could see well with his right eye, but the eye tired rapidly and the eye specialists insisted that he give up all work requiring the use of his eye, maintaining that otherwise he might lose it also. So from now on and to the end of his life Weismann had to depend upon the research of his students to whom he suggested problems for dissertations, problems of vital interest to himself, for in their solution he hoped to find support for his theories. In the course of his controversies with opponents of his theories, in the soundness of whose broad foundations he was firmly convinced, some points seemed to contradict them and therefore required a clear and definite answer. Either a factual refutation through research had to be obtained, or else the weak point in the theory itself had to be found and eliminated through a correction of the logic which led to wrong conclusions. The essays published by Weismann during these years as separate contributions were then assembled in one stately volume in 1892. In the same year his book *Das Keimplasma, eine Theorie der Vererbung* was published and appeared in an English translation in 1893. His comprehensive work *Vorträge über Deszendenztheorie* was printed in two volumes in 1902, revised in 1904 and again in 1913, a year before his death.

This brief outline of Weismann's work is sufficient to show that in 1894, the year when I was enrolled as a freshman in the

University of Moscow, Weismann was at the height of his fame, but already forced to limit his own work, on account of his second eye affliction, to a logical development and extension of his theories and his academic work to a supervision of the research of his students and to a course of fascinating lectures on the theory of descent before a large and admiring audience of undergraduates. Yet notwithstanding his fame, Weismann had few followers and few advanced students and many bitter opponents and sharp critics, some of whom did not spare in their controversy reference even to his physical disability. Thus it happened that my first acquaintance with Weismann's theories was due to violent attacks on them by Timiriazev, the professor of plant physiology in the University of Moscow, who took every opportunity to belittle their value and to emphasize Weismann's continuous admissions of errors in his logic and persistent attempts to correct them. I became interested in the problems which formed the basis of Timiriazev's attacks. I started reading everything pertaining to the theories of epigenesis and evolution (the latter term in the restricted meaning used at that time in contraposition to epigenesis, to denote development of an adult organism from an already pre-existing, complete set of hereditary units present in the germinal cells) in the hope of forming my own idea of the value of Weismann's theories and of the objections raised against them by numerous eminent opponents including such names as Oscar Hertwig, Herbert Spencer, and others.

Gradually my admiration for the logic and lucidity of Weismann's constructive mind and for the sincerity of his desire to find the correct answers to the questions which troubled him grew to such an extent that when in the first year of my post-graduate studies I was forced by student disturbances to leave Russia. I decided to go to Freiburg and to work for my doctor's degree under Weismann. It was a fortunate decision, for notwithstanding the great difference in ages—Weismann was nearly forty-two years older than I—a close friendship arose between us within a few months of our meeting, a friendship which withstood the trial of great differences in character and in opinions concerning the standards of responsibility to accepted tenets in relation to one's own concepts of justice, a friendship which lasted to the end of his life as witnessed by our correspondence which was interrupted only by the outbreak of the war.

Weismann was about six feet tall, well built, and with a head which immediately attracted attention by the sublime dignity of the expression of the thoughtful and yet kindly face. Owing to his affliction which made social life difficult for him because he was so keenly conscious of it, he developed a certain shyness in his behavior, which left him only in the presence of close friends. As already stated, his right eye with which he still could see, became rapidly tired not only in bright light, but also and most usually by flickering due to moving of objects. Perhaps his own physical disabilities made him the more cognizant and tolerant of shortcomings in others, due to physical or nervous causes. In such cases he did not hesitate to disregard red tape and to offer some unusual, but intrinsically just and right, solution of the difficulty.

He himself once told me how he persuaded his university colleagues to handle the difficult case of one of his candidates for the degree of Doctor of Philosophy, a young man who was so nervous that he broke down at the mere thought of an examination. He was a very good student, possessed extensive knowledge, was a hard and conscientious worker with a keen mind, and did a very creditable piece of scientific research. The examination for the degree of Doctor of Philosophy in the University of Freiburg was a formidable affair at the end of the last century. The candidate and the four professors constituting the examination board were required to meet in the forenoon, dressed up in swallow-tail coats, notwithstanding the early hour of the day. The examination lasted three hours with two five-minute interruptions during which the candidate had to leave the room, while the board discussed the quality of the answers. All examinations were oral. At their conclusion the candidate was asked to step out, his fate was decided by the board in a few minutes of discussion, the candidate was again called in and informed by the chairman of the board of the result of their decision. If the examination was successful, each examiner officially congratulated the candidate and shook hands with him. To Weismann it was evident that his candidate would break down and fail dismally at the very beginning of the examination if he were required to go through all formalities of such an examination. So he induced the examining officers to waive these formal requirements, to invite the candidate informally on each successive Sunday to their respective homes for dinner, while keeping the whole scheme secret, and to satisfy them-

selves as to the extent and sufficiency of his knowledge by seemingly casual questions in an after-dinner conversation on scientific subjects. Weismann's reputation and the respect for his personal integrity were so great that his scheme prevailed and all members of the examining board were fully satisfied that the candidate deserved to receive the degree.

One of the requirements, however, could not be set aside: each candidate was obliged to fill out a written request for admission to the examination and to pay a regular examination fee in advance. When after the secret meeting of the examining board, at which it was decided that the candidate passed the examination, Weismann returned to his room and, having called in the candidate, asked him to file a written request and to pay the regular examination fee to the University Treasurer, the poor man almost broke down, saying that it would be useless to do this because he would never be able to pass the examination. "But you have already passed it," said Weismann with a smile and explained to the dumbfounded young man that the talks at the dinners were really examinations and that the written request and the fee were merely official requirements which normally should have preceded the examination, and in his case the decision to grant him the degree had already been reached and no formal examination would be given. This case was never given publicity and remained known only to the members of the examining board and to some of their close friends.

Weismann never engaged in personalities even with such bitter opponents as Eimer who made fun of the color of Weismann's necktie on the background of the Swiss Alps as an example illustrating the problem of protective coloration. Such attacks Weismann passed in silence and discussed only the scientific value of arguments adduced in refutation of his theories. When at the end of my investigation of bees' eggs I read the manuscript of my dissertation aloud—this was a regular custom in the case of each candidate because Weismann could not read on account of his eye affliction — I used a rather sharp expression in criticizing Blochmann's accusation that Weismann misappropriated other peoples' ideas. Before I finished reading the sentence Weismann put his hand on my arm and sternly said: "You must erase this sentence. Science should have nothing to do with personalities." Those words made such a deep impression on me that I have followed his advice ever since.

During the four years which I spent in Freiburg I had many opportunities to discuss with Weismann not only the innumerable questions which constantly occupied his mind, but also many problems which arose in my own mind. It was Weismann's custom, whenever the weather permitted, to take an hour's walk in Schlossberg park between four and five o'clock in the afternoon. Soon he began to invite me to come with him, he walking half a step in front of me because otherwise the motion of my body disturbed his sight too much. We discussed everything that had to do with nature, from the problems of life and death, survival of the fittest, habits of animals and customs of aborigines, relations between plants and animals, etc., to casual observations made during the walk. On one occasion a horned viper, one of the most poisonous snakes found in Southern Europe, but occasionally also in the vicinity of Freiburg, crossed our path. I raised my walking stick with the intention of killing the dangerous creature, when Weismann arrested my hand with the words: "Oh, no! Don't kill it. It is such a wonderful mechanism."

An example of his attitude toward academic freedom was unexpectedly given me shortly after I passed my examination for the Doctor of Philosophy. As a new recipient of the degree I was invited by a student corps to give them an after-dinner talk on Russian universities and student disturbances which had assumed such magnitude that they were discussed even in German newspapers. As a precaution, being afraid of forgetting some interesting details, I wrote out the text of my proposed speech, although I used it only for reference. The speech was accepted with great enthusiasm and applause, giving the impression that its subject was approved by the whole audience. But when I sat down, up rose a professor who had also been invited by the students to address the gathering and who happened to be of Swiss origin, but a naturalized German. He started a fierce attack on me accusing me of being a troublemonger and concluding his speech with hysterically shouted words addressed to the students: "Gentlemen, you must *never forget* that you are Germans! You must never forget that you *are* Germans." You must never forget that you are *Germans*!" Then he sat down amidst a tumultuous applause which lasted several minutes.

Next day Weismann called me to his office and asked: "For Heaven's sake, what have you done? Professor so-and-so who was present yesterday evening at your talk and who is a member of

the University Senate (the Governing Board composed of full professors) brought in to the Senate a complaint against you as a political trouble maker. Do you have anything to say in your defense?" I answered that I was very astonished at the attitude of the professor, because in my speech I contrasted the conditions prevailing in Russia with those existing in German universities and expressed my admiration for the academic freedom reigning in the latter. As a proof of the correctness of my statement I gave Weismann the manuscript of my speech. I do not know who read it aloud to him, but he familiarized himself with its text from beginning to end and when he came next day to the laboratory, he returned it to me with the words: "You are quite right. There is nothing objectionable in what you said. Forget the whole business. The complaint against you has been dismissed by the Senate. Some of the naturalized Swiss take every occasion to display their own loyalty by behaving in a manner which they believe will show best what true Germans they are." I may add that even at that time of ever-growing nationalism in Germany very few native Germans liked the display of such chauvinism.

Weismann considered it important to respect and adhere to tradition and custom, lest one give unnecessary offense to people to whom such things meant much. This I learned to my amusement and woe when I was appointed Privat Dozent of Zoology at the University of Freiburg. At the beginning of this century there was a custom in the University, strictly adhered to, that a newly appointed privat dozent had to pay his respects to all members of the faculties by making official calls on them at their homes. There were 140 members of the faculty staff of the University at that time and to call on all of them seemed to be a formidable and time-robbing task. So I consulted a young privat dozent who recently had successfully gone through this performance to find out how the calls should be done and whether there might be some ways of achieving the task with less loss of time. He told me that the proper way to do it was to hire a cab and a footman, to give the latter a list with the addresses and a bunch of calling cards, and to make the calls sitting in state in the cab, dressed in a swallow-tail and high hat, with white gloves on the hands, and doing absolutely nothing, while the footman would stop the cab at each listed address, get out, ring the bell, and give one of the calling cards to the maid. When I realized what a sham the whole business really was, because nobody ever asked the

caller to come in and the cab proceeded immediately to the next address, I figured out in my mind that the most efficient way to accomplish the job of calling would be by arranging all cards in a geographical sequence, going from house to house in the order in which they were numbered to the end of a street, then repeating the process in the next nearest street, and so on. Accordingly, I prepared a list of addresses in that order and managed to make 70 calls in one afternoon, quite elated by the fact that the remaining 70 could be done on another afternoon instead of losing several days on this ridiculous performance. What was my amazement and embarrassment when next day Weismann came to see me in the laboratory, flushed and unhappy, telling me in an injured tone that I had offended a number of distinguished professors. To my query "How so? I have called on 70 people in the manner in which I was advised to do," he answered: "Yes, but you should have called first on all the Geheimrats, then on the Hofrats, then on the Ordinariuses, on the Extraordinariuses and finally on the Privat Dozents. But you have mixed them all up and called even on some Privat Dozents before Geheimrats!" I never finished my calls, because at that time I had already decided to leave Germany and to go to the United States. Nevertheless, not wishing to hurt Weismann's feelings, I promised him to make such amendments as possible by adhering to the order of title seniority in the future. He knew that I was engaged to marry an American girl, and, although he hoped that I would eventually settle in Germany and continue my academic career there, he later accepted my departure to the United States as sufficient excuse for my not completing the round of calls and forgave me my clumsy break of an established custom.

More serious was another occurrence which almost led to a complete break between Weismann and me, but which, by an unexpected and fortunate turn, cemented our friendship more strongly than before. However, he never understood why I preferred to act in the way I did, unwittingly leading to a misinterpretation of my motives, rather than to file a complaint against the person whose behavior was the cause of the whole trouble. At least that is what Weismann himself told me when on my passage through Germany in 1906 I had the great pleasure of visiting him at his home in Freiburg. The occurrence referred to happened in 1903, shortly before I was married. At that time Weismann had two assistants. One of them was Georg von Guaita, a good friend

of mine, a former pupil and an admirer of Weismann. The other assistant, whose name I prefer not to mention here, was also a former student of Weismann. Unlike von Guaita, he was an opinionated, ignorant, and lazy man who used to take advantage of Weismann's confidence in the honesty of his subordinates, his preoccupation with his own thoughts, and his inability to suspect them of any wrongdoing. Instead of doing the work which he was supposed to do, that assistant was spending hours at a time in playing with Egyptian jumping-mice which he kept in a cage in a room at the other end of the building and separated from Weismann's office by the advanced students' room and his own office. When the sound of the opening and closing of the front door announced Weismann's arrival, his assistant would rush into his own office, sit down at the table, and pretend that he was engaged in serious microscopic study of his slides. Other undesirable qualities made this man so unpopular with the rest of us that nobody spoke to him any more nor shook hands with him in the morning as was customary not only in Germany but in all continental Europe. His reputation became notorious; it spread and became so bad that once I received a letter from a student of another university telling me that he would like very much to come and study under Weismann, but that he did not want to do so while Dr. So-and-so remained as Weismann's assistant. Several candidates for the degree of Doctor of Philosophy, including the late Victor Bauer, a Catholic priest, Dr. Georg von Guaita, and myself, were anxious to see Weismann freed of the burden of moral responsibility for allowing such an objectionable and ignorant individual to ruin the reputation of the laboratory by continuing to employ him as his assistant. Indeed, the man's ignorance was phenomenal. He not only did not acquire new knowledge but seemed to have forgotten a great many things he had learned as a student. Entrusted with the duties of supervising the practical work of beginners, he was often stumped by the simplest technical problems. I remember that one day he rushed from the beginners' room into our room and urged me loudly to show him quickly how to expose the nervous system of the crayfish, admitting that he had forgotten how to do this. As a consequence, the students were unable to find the nervous system and required his help. He had completely forgotten that the nervous system of the crayfish is enclosed in the sternal canal and that to expose it, the dorsal wall of the canal must be removed. Yet two years

previous to this lapse of memory he had passed his examination for the degree of Doctor of Philosophy quite creditably.

When the situation in the laboratory became quite unbearable, I was asked by other members of the group what could be done to ameliorate it and how we should handle this difficult problem. They had confidence in my judgment because I was already a privat dozent, and the friendship between Weismann and myself was well and widely known. They also wanted to know whether I would be willing to join them in a complaint to Weismann and suggested that if I were agreeable, I as the senior in position should present the complaint in the name of all of us.

I was perfectly willing to see something done to get rid of the objectionable assistant but, having grown up in Russia, I had an inborn aversion to anything smacking of secret denunciation and had a misgiving that such a complaint would place us in the position of informers. To find a way out of this difficulty I suggested that we first approach the assistant himself and offer him the choice of either submitting his resignation within a week, under any pretext that he might think of to justify his request, or else facing the ignominy of our complaint accompanied by our request that he be removed from office on the strength of the evidence presented in our "bill of particulars." We truly expected that he would avail himself of the first alternative which gave him the opportunity to submit his resignation on the ground of some personal loss, such as the unexpected death of a grandmother and the necessity of returning to Riga to attend to the matter of inheritance. Such an imaginary cause would have left open to him the door to an academic career somewhere else and also would have explained the suddenness of the request at the end of a term. Instead of doing this, he went to Weismann and filed a complaint against us, accusing us of trying unjustly to squeeze him out of his position as assistant, the duties of which he was discharging honestly and to his best abilities. We were not aware of the results of our ultimatum, but, waiting for the expiration of the allotted time, decided among ourselves that in the unlikely case of his selecting the second alternative, he would tell us his decision and that our complaint to Weismann should then be accompanied by the statement that unless the accused were discharged, we would be forced to leave the laboratory because we could not remain under the same roof with him.

Before the expiration of our ultimatum to the assistant, we were staggered by Weismann's appearance with the information that his assistant had filed a complaint against us and with a request for an explanation. It was then that I had a long conversation with Weismann, explained to him the whole situation, and filed our complaint, pointing out at the same time our decision to leave the laboratory unless the man was discharged. Weismann listened attentively, asked that two weeks be given him in which to think the matter over, and promised to let us then know of his decision.

It was not easy to attend to our work while we were waiting, but we waited patiently. When the two weeks had elapsed, Weismann came into our room and, closing the doors, addressed us. He said that he realized the gravity of the situation and appreciated our concern for himself. He admitted that he believed in our sincerity and in the delinquency of the assistant in respect to his duties but said that he had decided to give him another chance because a dismissal would put the future of the young man in jeopardy, that therefore he would recommend his reappointment as assistant for another term, and that we must try during that time to maintain a spirit of decent relationship in the laboratory.

We listened in silence and with great consternation. When Weismann left us and returned to his room, we discussed the unexpected situation again among ourselves. Should we abide by Weismann's decision and endure another term under the same roof with a man with whom we had to be in daily contact and with whom even the Catholic priest refused to shake hands, or should we do what we said we were going to do, that is, pack our laboratory possessions and leave in a body? We all felt keenly that both alternatives put a heavy demand on our feelings of loyalty to Weismann because we could not see any chance of improvement in the situation if we submitted, yet knew well that we would hurt Weismann deeply if we decided to leave him. However, feeling that the second alternative was better for Weismann's own good, we decided in its favor with heavy hearts and started to pack our instruments and books. Again I was asked to be the first to say goodby to Weismann and went to his room. It was a great ordeal for me, but it had to be done. I said that I came to say goodby to him and, seeing his astonishment, reminded him of our decision, tried to explain to him that we had no other choice, that we regretted deeply the necessity to leave him, but

that we made our decision out of regard for him and hoped that it would be for the best. For a moment Weismann seemed not to have understood the situation that confronted him. "Do you mean to say that you are all going to leave my laboratory for good and that nobody will remain in it?" "Yes, Herr Geheimrat, that is exactly what we told you would be left for us to do, if you decided to deny our request for dismissal of the assistant. We are all leaving. One after another they will come to say goodby to you, but I was asked to be the first to do so." Stunned by our decision and by the prospect of an empty, deserted laboratory, Weismann suddenly suspected that there might be truth in the suggestion made by the assistant in the course of his complaint, namely, that I was the real cause of all the trouble, because I myself aspired to replace him. This was, of course, a malign invention, because I had already decided to leave Germany for America. But Weismann did not know this and when he himself, for whom I had the deepest feeling of veneration as for my spiritual father, made this accusation directly to my face, it was too much for me. I jumped up shouting that he had no right to say this, that there was no truth in it, and I was not only not the originator of the complaint against his assistant but had reluctantly agreed to join the others and to represent them at their own request, and that Weismann could satisfy himself of the truth of my statement by coming at once with me and asking the other men for a direct answer to his question. I was told afterwards by the caretaker of the laboratory building that one could hear us both shouting at each other at a distance of a block from his room! Grabbing Weismann by his arm, I dragged him after me through the assistant's room to our room and said: "Here they are. Now ask them!" And there we were, all in one room, with all our things packed and stacked on the tables and everyone of us disconsolately looking at Weismann, who, heavily breathing and almost exhausted, leaned against the door post and surveyed us in silence. "Come here!" he called to the assistant, and when the latter stepped through the door, Weismann asked von Guaita what he had to say against him and why he decided to leave the laboratory. Dr. von Guaita was a shy and very nervous man, one who had difficulties in expressing himself when under the strain of an emotion. He tried his best to relate all the reasons for his decision and to make clear why the presence of the other assistant was for him so unbearable. To von Guaita's every remark the assistant had a glib

answer justifying himself and accusing von Guiata of misrepresentation and malevolence. One after another all the men tried to justify their accusation and to give the true reasons for their action, and in every instance the repartee was repeated, filling us with a feeling of impotence in the presence of such a skillful adversary. The last man whose opinion Weismann asked was Victor Bauer. Looking Weismann straight in the face Bauer said, "Herr Geheimrat, it is evident that you do not believe us, no matter what we say. So I am not going to say anything about the reasons why I am going to leave your laboratory, except that I consider your assistant to be a rascal ("Schurke") and I do not intend to associate with him." Twisting his moustache—a characteristic gesture of his—the "Schurke" found the only reply to this statement, by saying with a smirk on his face, "The attitude of this gentleman seems to be very personal." Then, in answer to Weismann's request to give his side of the whole matter, he delivered a long speech in which he twisted and turned the facts so skillfully that everyone but himself appeared to be a schemer and a liar. Finally, reserving his trump card for the last move in his own defense, he looked at Weismann and then at me and with great deliberation spoke his last words: "As for Dr. Petrunkevitch, I could have him put in prison for two years." "What do you mean?" exclaimed Weismann, and turning toward me asked for an explanation of the crime which was so grave that it deserved such punishment and of which I was just accused. "I have no idea," I answered, "I am not aware of having done anything criminal." "Oh, yes, you did," said the assistant, "You have criticized our Kaiser in a private conversation with me." Weismann glanced at him with amazement and contempt in his wide open eyes and, suddenly turning on his heels and with his back to him, thrust his thumb over his shoulder, and said, "File your resignation" and without another word left the room. When a few minutes later I entered Weismann's office I found him in a state of deep emotion. Not daring to express my own gratitude to him, because at that time any incautious word of criticism directed against the Kaiser could have been easily construed as *lèse majesté* by any unscrupulous informer, and in my case the threat was made in the presence of Weismann and several other witnesses, I assured him that, while it is true that I had criticized some of the actions of the Kaiser, I used no disrespectful words; and then I told him how relieved we all were by his decision which

made it possible for us to stay in his laboratory and to continue our work under his guidance. He pressed my hand, told me how pleased he was to hear this; and I returned to our room to unpack my things and see with satisfaction that the others unpacked theirs.

The wretched assistant resigned and was replaced by another. During the Easter recess I was married in London in a magistrate's office, returned with my bride to Germany, and a few days later was again married in the Russian church in Baden to fulfill the requirements of the Russian law which did not recognize civil marriage. Until the end of the term I continued my course of lectures and then began my preparations for a visit to Russia before leaving Europe for America. Weismann gave me a letter of introduction to Whitman who was a former student of his and at that time occupied the chair of zoology in Chicago. At the same time Weismann advised me not to file my resignation as privat dozent until I had either found an academic position in the United States or received from him a request to file it, a request which he would address to me only in case of need to fill the position. We parted and I thought that I would never see him again. But in 1906 I decided to go to Russia because the life of my father was threatened by the Black Hundred, a political reactionary organization encouraged by the Tzar's government to acts of violence and already with blood on its hands. I hoped to be able to serve as a guard to my father and possibly to frustrate an attempted assassination. To go to Russia I had to cross Germany and I decided to make a slight detour and to visit Weismann. He received my letter the day before my arrival, which was the day before his own planned departure for his summer vacation on the Bodensee. Although he had already packed his trunks, he decided to postpone his departure on my account. I shall never forget this last meeting. There was warmth in Weismann's greeting that dispelled in one flash all apprehension I may have had concerning our friendship, which in the interval of the three years of separation might have easily been superseded by some new friendship. It was not so. His smile and his cordial words of greeting clearly attested the permanency of our friendship, which could not be seriously endangered either by casual misunderstandings or by separation. We spent the day telling each other about what occupied us during the years of my absence and about our plans for the future. At the age of 72, Weismann, handicapped

as he was, was still pursuing evolutionary problems, was still breeding butterflies under different experimental conditions, aided in his work by the caretaker of the laboratory building. It is natural that in our conversation we should have touched upon the subject of the past trouble which caused the removal of the assistant. Weismann told me that the arrogant fellow repaid him for the kindness shown to him during the years preceding the resignation by incorporating whole passages from Weismann's *Theory of Descent* in his own popular book on the evolution of man without so much as mentioning their source and offering them as his own thoughts, and how, being an ignoramus in anthropology, he worried the life out of several professors by pumping them for information which he needed for that book. In parting, Weismann and I promised each other to keep up our correspondence and we both kept our promise. The letters which he wrote to me are now in the manuscript collection of the Yale Library.

One accusation raised against Weismann, namely, that he was a reactionary and a chauvinist—an accusation made on the strength of the fact that he signed the notorious Manifesto of the German professors in the First World War—I cannot leave unanswered. Weismann was almost 81 years old, blind and sick, when the Manifesto was placed in his hands for signature. In his condition he could not have clearly understood the meaning of the Manifesto. All his life he admired the English, their men of letters and science. He was a liberal-minded man and a freethinker. According to his own statement delivered at the celebration of his 70th birthday, he believed that the greatness of Germany was due to the idealism of the German people. I feel that it is no exaggeration to say that Weismann himself was one of the finest examples of idealism. He certainly was one of the greatest and best men I have ever known.

Robert Watt: Physician and Bibliographer

ARCHIBALD L. GOODALL* and THOMAS GIBSON*

IN the entrance hall of the Royal Faculty of Physicians and Surgeons of Glasgow there hangs a striking portrait (Fig. 1) of a handsome man of about forty years of age with intelligent, humourous eyes. This is a likeness of Robert Watt whose great work, the *Bibliotheca Britannica,* is known and used by bibliographers and librarians throughout the world. The man and his other works are almost forgotten; that he was a successful practitioner is surprisingly little known, even to the medical profession in his own city. This is mainly a legacy from his own time, for he came from an obscure, impecunious family and retired from medical practice two years before his early death. The *Bibliotheca,* which would have brought him great renown had he lived, was published posthumously. His death occurred, therefore, when he had faded from the medical scene but had not yet appeared on the bibliographer's horizon. His obituary notices confine themselves to his name and degree, and there are no contemporary accounts of his life; indeed, for a man of Watt's obvious genius, surprisingly little has been written about him. The fullest account is Finlayson's *Life and Works of Robert Watt* (1897) but even this admirable sketch, which includes most of the known facts about his life, gives little clue to the character of the man or any appraisal of his published works.

In an attempt to remedy this we have studied afresh the records of Watt available to us and all his published works and manuscripts which are still extant. The absence of any contemporary biography, however, makes any real assessment of his character almost impossible.

Boyhood and Youth

In the register of baptisms in Stewarton Parish Church, preserved in the New Register House, Edinburgh, is the following entry: "Robert, lawful son to John Watt in Bonnyton and Janet Calderwood his spouse. May 1st 1774. Bapd."**

It is therefore likely that he was born in the early part of 1774, but there is no register of births for that period and the

* Glasgow, Scotland.

** Finlayson, probably because of a careless transcriber, not only misquoted this entry but gives it as a transcription from the register of births.

exact date must remain conjectural. In the same register are the baptismal records of his older brothers, John (23 March 1766) and David (13 May 1770).

His father was a small farmer in Bonnyton near Stewarton in Ayrshire (Scotland), a farm which later became known as Muirhead or Moorhead, in which name it passed to John Watt junior on his father's death in 1812. In 1823 John sold it to Captain John Cheape who renamed it Girgenti by which name it is still known. The size of Bonnyton does not suggest affluence in the eighteenth century, and the Watt family may have suffered poverty and hardship in bad seasons. Not far away a similar type of Ayrshire farm was leased by the family of Robert Burns, the poet, who has recorded the chronic penury of his class.

The only source of information about Watt's childhood is a letter written by himself to an unnamed friend. It was printed in the first edition of Chambers' *Lives of Illustrious and Distinguished Scotsmen* (1841) but has been omitted from later editions.

He went to school at the age of six and learned to read, write, and count. He said that he was a favourite with his teacher and suffered from the envy of his schoolfellows on that account but he also remarked: "From the difficulties I had to encounter in every branch of learning afterwards, I think my proficiency at that time must have been very small." He certainly developed a taste for reading and devoured *Pilgrim's Progress, The Lives of Scotch Worthies,* and similar works which he found in his father's house.

About the age of twelve he left school and for the next few years worked as a ploughman to neighbouring farmers. However, Watt's father wished him to learn a trade rather than suffer the slavery of the eighteenth century farm servant, and when he was seventeen he went to work with his brother John, a joiner and cabinetmaker who had returned from Glasgow to set up his own business in Stewarton.

Just prior to this, however, he had made an interesting journey with a party which first went into Galloway to build stone dykes and later into Dumfriesshire to make roads. In Dumfries the party was lodged for a short time in Ellisland, the farm which belonged to Robert Burns, and there Watt saw the great poet. His later recollection of these meetings was somewhat vague but he remembered reading Burns's poetry and borrowing books from Burns's library. He wrote that this desultory reading gave him no great

knowledge of any one subject but a great desire to learn more. His first purchases with his hard-won earnings were a dictionary and an English grammar.

The trade of cabinetmaker, at first interesting, began to pall. Then one day brother John brought to his house a student at Glasgow University. From him Watt heard "marvellous accounts of what mighty things were to be learned, what wonders to be seen, about a University; and I imbibed an unquenchable desire to follow his course."

At this point Watt's letter ceases, and we turn to the *New Statistical Account of Scotland* of 1845 where the story of Stewarton is recorded by Mr. Duncan Macfarlane, schoolmaster. In 1792 Macfarlane gave young Watt private lessons in Latin and Greek for an hour each morning before he started his work as a carpenter, and his pupil progressed so well that he was able to enter the Greek and Latin classes at Glasgow University in 1793 and indeed to win a Greek prize. Next year in Glasgow he studied Greek and logic and in 1795 he transferred to Edinburgh University to study moral and natural philosophy.

Up to this time Watt seemed to be acquiring a general education without a career in view. By the summer of 1796 he had decided on divinity as his vocation but he took the class of anatomy at Edinburgh, either as a part of his general education or as a possible second choice of career. In this class he won a prize of £10 for the best essay on "Regeneration," an ambiguous title, but no doubt the prize was a welcome addition to his finances. Another source of income in 1797 and 1798 was his appointment as parish schoolmaster of Symington, near Kilmarnock. Perhaps because of this demand on his time he enrolled only for the class of divinity at Edinburgh in that session but did so well that he won a prize of £8 for an essay on "Prayer."

Macfarlane's story in the *New Statistical Account* stated that Mr. Logan, the parish minister at Symington, persuaded Watt to abandon the ministry and take up medicine. The reasons for this are not known, but Watt finished his medical studies in 1798/99.

He qualified, not with a university degree, but with the licence of the Faculty of Physicians and Surgeons of Glasgow, which allowed him to undertake surgery or general practice. The university degree of M.D., on the other hand, would have permitted him to do only consultant practice. It was therefore common for medical men to begin their professional careers as Licentiates of

the Faculty and later to acquire an M.D. before beginning consultant practice.

Watt sat for the examination on 6 April 1799, when he was asked to give a discourse on hydrocoele and to make up a prescription. Both were satisfactorily carried out, and shortly afterwards he began his medical practice in Paisley.

Climbing the Ladder

All the known facts of Watt's early professional career fit the pattern of a restless, ambitious man eager to make himself widely known in medical circles. At first sight his choice of Paisley seems out of character. Why not begin practice in Glasgow itself? His studies, however, had been carried out in Edinburgh, and he lacked the patronage of the Glasgow teachers. Paisley was thus an obvious alternative; it was the nearest town of any size and, lying but eight miles from Glasgow, was within travelling distance for medical functions.

Watt had a tremendous capacity for hard work and lost no time. He began business in 1799 in Smithhills Street in Paisley, near the old bridge over the river Cart, and his practice increased so quickly that in 1802 he took as a co-partner Dr. James Muir who had been a fellow student. Watt started publishing almost at once, and two papers appeared in the *Medical and Physical Journal* of 1800. The first was in the form of a letter dated 29 December 1799, entitled "Description of a New Instrument for Operating for the Stone." The instrument was ingenious enough, but Watt reported it before trying it on a living subject although he implied he had used it on the dead. Considering his lack of experience it seems almost presumptuous to suggest a new surgical instrument.

The second paper, dated 3 April 1800, was entitled "Description of a New Machine for Curing Distorted Limbs." It began with a rather trite introduction on the importance of early publication of improvements in technique to forestall suffering. It went on to claim that Watt had not seen a case of valgus or varus deformity uncured in his part of the country. To ascribe this to the use of his machine, when he had been in practice for less than a year, seems even more presumptuous, and it provoked a reply from a Mr. Sheldrake of 50 Strand, London, who poured scorn on Watt's claim to originality. Watt replied, and the controversy continued through two letters on each side. The arguments, however, were largely semantic and the abuse undignified.

In May 1801 he contributed a report to the *Medical and Physical Journal* of two cases, one of accidental inoculation of the nose with cowpox by a man who had touched his niece's vaccination and one of a child vaccinated during a smallpox epidemic who developed mild smallpox as well as cowpox.

In 1806 Watt was one of the founder members of the Paisley Medical Society, which was instituted on 19 September

> to consider the propriety of regulating the prices of various branches of the practice, they having reflected upon the increased value of all the necessaries of life and the advances which every other corporation had made in its prices while theirs had remained stationary for a long series of years and having observed that the table by which they had been hitherto guided was not sufficiently comprehensive nor adapted to the different ranks of the community, unanimously resolved to form themselves into an interim society to digest a plan for affixing the rates at which every part of the business should be in future charged.

Watt was responsible for drawing up the table of surgical rates which was published in the local press. For many years afterwards every new practitioner in Paisley was required to sign the minute book of the Society in token agreement to the prescribed charges.

Later in 1806 Watt must have proposed to visit England, for there is a record of a paper of his having been read to the Newcastle Literary and Philosophical Society in October 1806. He did not appear in person, and John Chennell read the paper which was entitled "The Manufacture of Dunlop Cheese."*

On 5 January 1807, Robert Watt was admitted a full member of the Faculty of Physicians and Surgeons of Glasgow and to the benefits of its Widows' Fund. The following year he published his first book, *Cases of Diabetes, Consumption,* etc., *with Observations on the History and Treatment of Disease in General.* It was dedicated to "Mr. James Muir, surgeon . . . by his partner and friend the author" and the preface bears the date 10 October 1808.

In the light of present knowledge the book is naïve. Watt used bleeding, blisters, diet of animal food in abstemious portions, and mercury. He described five cases, only one of which today sounds like diabetes mellitus. He then added chapters on asthma, cholera, colic, consumption, chorea, and plethora, ascribing to all cold or chills as an early symptom. One case of colic suggests appendicitis.

* We are indebted to Dr. Ian Porter for discovering this record and to Dr. W. S. Mitchell for the details.

The reception of the book was not sensational, and only the *Edinburgh Medical Journal* gave a review of any length. In response to this review, which was not unfavourable, Watt wrote a paper for the *Edinburgh Medical Journal* on the treatment of diabetes mellitus.

According to Chambers, Watt was now looking south of the border for advancement and he is said to have toured England in 1809. It may have been during this tour that he became a member of the London Medical and Chirurgical Society, for this distinction appeared on the title-page of his next book in 1812.

In 1810 he obtained the degree of M.D. from King's College, Aberdeen, his sponsors being Robert Cleghorn and Thomas Brown. This degree was probably achieved without examination, for the sale of degrees was at this time not unknown in Scottish universities.

Scotsmen were not very popular in London in the early nineteenth century, and Watt resisted the temptation to move south. Instead in 1810 he bought a large house in Queen Street, Glasgow, and moved there to consultant practice and the teaching of medicine. By this time too he had a rapidly growing family, having married in Paisley Marion Burns who was to bear him in all nine children and suffer tragically after his death.

In the *Edinburgh Medical and Surgical Journal* of April 1811, Watt published a short note on diarrhoea and dysentery, based on information sent by Mr. James McLeod, hospital mate, to his brother, Mr. George McLeod, surgeon, Glasgow. It contains nothing of interest.

Maturity: Physician, Teacher, and Author

After his move to Glasgow, Watt rapidly reached eminence in his profession. He was an assiduous attender at meetings of the Faculty of Physicians and Surgeons and appeared often in its minutes. On 7 October 1811, he was elected Boxmaster and joined the Library Committee on 4 October 1813. In 1814 he was made a manager of the Lunatic Asylum and a member of the committee to report on the education of medical practitioners. On 4 October 1814 he achieved the acme of distinction by being appointed president of the Faculty, a post he held for two years.

He was active, too, in other spheres: In 1814 he was a founder member and became the first president of the Glasgow Medical Society. In the same year he was elected physician to Glasgow Royal Infirmary, a post which he retained until his retirement

in 1817. Some of his case records have been preserved but tell us little of the man or his methods. In 1816 he became president of the Glasgow Philosophical Society.

Although during the whole of his Glasgow period Watt must have worked incessantly at the collection and sorting of material for the great *Bibliotheca,* writings on other subjects continued to flow from his pen. His next publication (in 1812) was a catalogue of the works of his library, which he made available for his students. It may have been intended mainly as an attraction to students to enroll with him, but it is a book of great historical importance. It is the first evidence of his flair for bibliography and marks the first step on the way to the compilation of the *Bibliotheca.*

The catalogue is now a very rare book and the copy in the Royal Faculty is the only one known to us. Fortunately Cordasco's facsimile, taken from the Faculty copy, is now available for study. The title-page reads *"Catalogue of Medical Books for the Use of Students Attending Lectures on the Principles and Practice of Medicine;* with an address to medical students on the best method of prosecuting their studies . . . by Robert Watt, M.D., member of the Faculty of Physicians and Surgeons of Glasgow. Member of the London Medical and Chirurgical Society, &c., and lecturer on the principles and practice of medicine in Glasgow. Glasgow: Printed by James Hedderwick & Co., to be had of J. Smith and Son, Brash and Reid, and Walter Duncan, booksellers, and of the porter at the class-room. 1812."

It began with a lecture to students, rather pompous but containing much sense. He suggested that they should seek original sources and pay attention to facts and not to mere opinions. The plan of his course was anatomy and physiology, pathology, chemistry, materia medica and remedies, and it had a modern "vertical teaching" design. The lecture was dated 10 February 1812. The regulations for the library followed, the charge for its use being five shillings for six months.

The catalogue itself is arranged in dictionary style from Abercrombius to Zimmermann but there are few subject entries, these being given usually where the authorship is anonymous. There are 1,066 entries in all. The ultimate fate of these volumes is unknown; they do not seem to have passed to the Faculty Library as many of the books listed are not in the Faculty and those which are show no evidence of Watt's previous ownership.

In 1813 Watt published his *Treatise on the History, Nature and Treatment of Chincough . . . to which is subjoined an Inquiry into the Relative Mortality of the Principal Diseases of Children . . .* (Glasgow, 1813). The manuscript of this work is preserved in the Faculty Library and is almost identical with the printed version. The work is pedestrian in the part relating to theories of whooping cough but comes to life in its description of cases, two of the fatalities being Watt's own children. Both were examined post mortem.

The most important part of the book is the *Inquiry* in which Watt compared the numbers of children under the age of ten who died in Glasgow before and after the introduction of vaccination. The only records available were burial registers, and Watt laboriously waded through these to obtain his figures. After prodigious labour he concluded that, while the deaths from smallpox had fallen steeply since vaccination, the total deaths of children remained about the same, and measles and other diseases killed off the children saved from smallpox by vaccination.

Controversy on these figures continued for fifty years, but we have no doubt of their accuracy nor, as far as the records are reliable, of their significance. The reason for this constancy is discussed in Creighton's *History of Epidemics in Britain.* The accepted theory was that vaccination saved a number of weaklings from smallpox, who then survived to be infected by measles and, owing to their poor general state, to be killed by that disease. At any rate there can be no doubt that this was the observation of a keen and unbiased mind with good ideas of sound statistics and energy to pursue the available sources. His work is the progenitor of many statistical works in infectious disease which have clarified our ideas and saved millions of lives.

In January 1814 there was published in the *Edinburgh Medical Journal* a review of the report of the National Vaccine Establishment for 1813. The writer referred to Watt's statistics in critical fashion. Watt replied in the April number in a paper entitled "Observations on the Influence of Vaccination on other Diseases and on Population in General." This was dated 18 January 1814 and appeared just before Colles' famous paper on fractures of the radius. It justified his figures and showed that similar conclusions might be drawn in London and other towns.

The next paper by Watt appeared in *Medico-Chirurgical Transactions*, Vol. 5, and was read on 1 February 1814. It was

entitled "Cases of Periodical Jactitation, or Chorea." This was a single case report and suggested a diagnosis of hysteria. He recounted in it the story of the Bargarran witchcraft trials in 1596 which took place near Paisley and were presided over by James VI, the donor of the charter to the Royal Faculty of Physicians and Surgeons.

Watt also published in 1814 his only non-scientific work, *The Rules of Life.* This was a rather uninspired collection of improving aphorisms, many of which were not original. It would have been an excellent entertainment for a Victorian Sunday afternon.

Watt's last contribution to periodical literature was a letter to the editor of the *Annals of Philosophy,* Thomas Thomson, who was also a member of the Faculty. It was dated 4 November 1818, and was entitled "On the Formation of the Rainbow," giving an explanation which was not too far from the truth.

Two unpublished manuscripts of Watt are preserved in "Medical Essays"—manuscript records of the meetings of the Glasgow Medical Society of which, it will be recalled, Watt was the first president. The first paper of the first volume dated 2 January 1815, was "Observations on the Nature and Treatment of Erysipelas" by Robert Watt. It was in his own handwriting and considered whether erysipelas is contagious, whether the weather affects it, and what is the best treatment. Nine cases were described, all were treated in the Royal Infirmary, and all recovered. The paper was delivered on 17 January.

The second volume of "Medical Essays" also begins with a paper by Watt dated 2 January 1816. It was entitled "Observations on Cancer" and suggested treating malignant ulcers by scarification. It was read on 16 January 1816. The "Medical Essays" are now in the Royal Faculty Library.

The Closing Years

In 1817 Robert Watt gave up medical practice. He was then forty-three years of age and had achieved a place of distinction in the medical life of a large city. But "he saw himself verging towards the afternoon of his life in an impaired state of health and his great work still unfinished. He moved to Campvale and devoted the remaining two years of his life to his *Bibliotheca.*"* There he was helped by his sons, by William Motherwell, the poet, and by Alexander Whitelaw. He often directed the work

* Note on the back of the cover of Part I of the *Bibliotheca Britannica* which appeared in 1819 and is preserved in the Mitchell Library, Glasgow.

from his sick bed. He lived just long enough to see the book largely completed and the printing begun, a martyr to his own consuming energy and the author of the greatest bibliography ever made by a single man.

He died on 12 March 1819 and was buried in the Cathedral Churchyard, Glasgow. Bare notices of his death appeared in the press, and there were no obituaries. Even his grave carries no memorial stone. We have traced the burial register which states that he died from consumption and over the lair previously sold to him is a more recent stone to another man named Watt, which appears to have been placed there by mistake.

The Bibliotheca Britannica

This monumental work is an astonishing product of the mind of one man. Bibliographies there had been before; bibliographies of one author, of one subject, or of one discipline but all were limited in scope. Watt set his limit at all books published in Britain or the British Dominions on all subjects, a daunting task even were the modern tools of bibliography available for it. He even included the indexing of periodicals. The full title of the first part issued, which is preserved in the Mitchell Library, Glasgow, reads:

Bibliotheca Britannica
or
A General Index
on the
Literature of Great Britain and Ireland
Ancient and Modern
including
Such Foreign Books
as have been translated into English or
printed in the British Dominions.
as also a copious selection from the
writings of the most distinguished
authors of all ages and nations.

On the back cover of this part was printed: "Remarks on the plan and utility of the Bibliotheca Britannica." The whole work was eventually published in four volumes, two of authors and two of subjects. The subject entries referred back to the author volumes. Volume I was printed at Glasgow University Press, Volumes II to IV by Abernethy and Walker of Edinburgh.

The book was dedicated to King George IV "by permission." The preface noted Watt's death and outlined the plan of the work. In most copies was inserted a facsimile letter signed by George Jardine, Ralph Whitelaw, James Ewing, and Thomas Chalmers, eminent Glasgow citizens, assuring subscribers that the *Bibliotheca* would be completed despite Watt's death.

Volume I: Authors included names from AA to HYRDE; Volume II: names from IBANEZ to ZYPOEUS. There were 40,000 author entries. Volume III: Subjects spanned A to HYSTERICS; Volume IV: I to ZYTHUM.

In a project of this magnitude there were inevitably errors and inaccuracies, there were false judgments and sometimes undecipherable entries. Curiously, the University of Aberdeen of which Watt was a graduate was not mentioned, and the University of Glasgow was stated to be the oldest in Scotland and to have been founded in 1404. This University was founded in 1451 and was preceded by the University of St. Andrews. The University of St. Andrews is not entered and that of Edinburgh is noted only as "one of the four Universities of Scotland." Finlayson (1889) noted the puzzling entry under Peter Lowe, where the *Bibliotheca* stated that Lowe's works were translated into foreign languages. This looks like the work of an inefficient amanuensis, but we have compared the handwriting of the manuscript entry in Paisley and it appears to be in Watt's handwriting. The Baskerville Press was not credited with Hunter's *Gravid Uterus* but this was noted under Hunter. There was no reference to the Faculty of Glasgow nor to the Royal College of Surgeons of Edinburgh though he referred to the London College. Both Colleges of Physicians were briefly noted. There were eleven pages on Scotland, but England had no entry. On the credit side he devoted four and a half closely printed pages to Aristotle, eight pages to Cicero, and similar extensive references to other classical authors.

After correction by all the methods of modern scholarship, there remains accurately listed an immense mass of information which was not easily available in the early nineteenth century. The work was years in advance of any similar contemporary bibliography, and librarians still use it today. One can only realise its scope by using it.

The Ill-Fated Watt Family

After his death, one misfortune after another plagued the family who for years had been dedicated to Watt and the almost

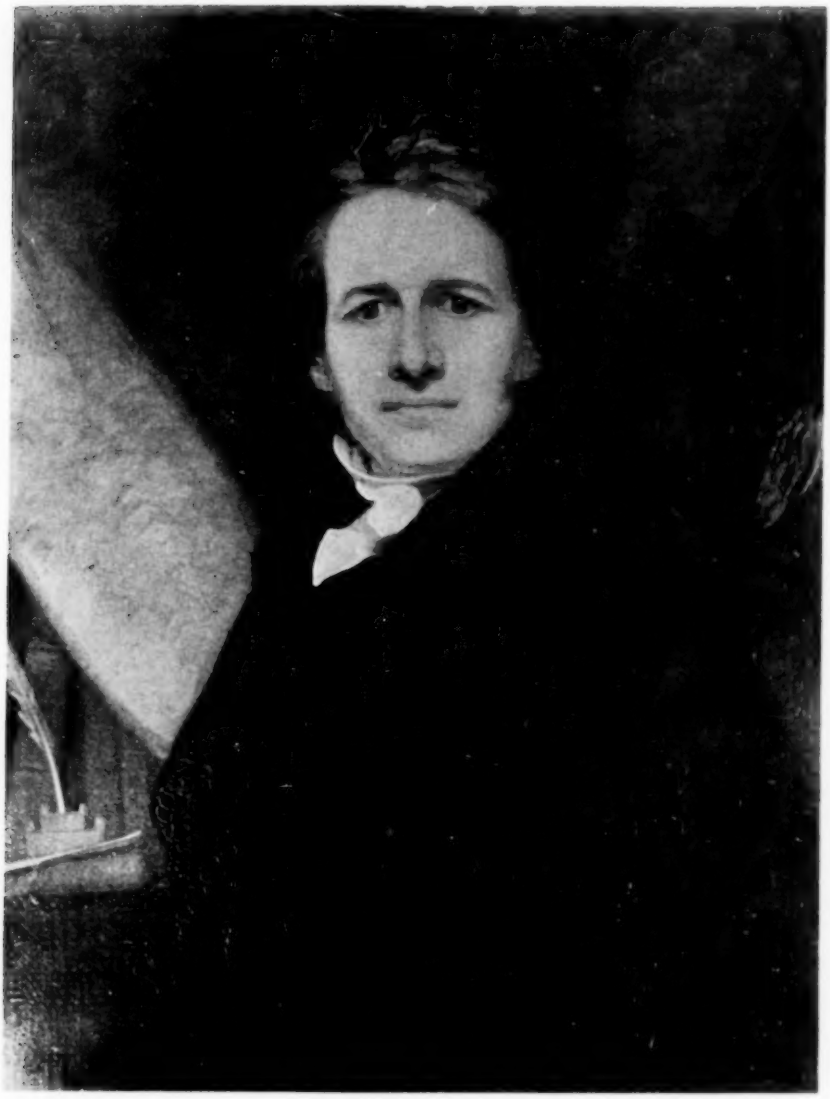


Fig. 1. Robert Watt (1774-1819). Portrait in the Royal Faculty of Physicians and Surgeons of Glasgow.

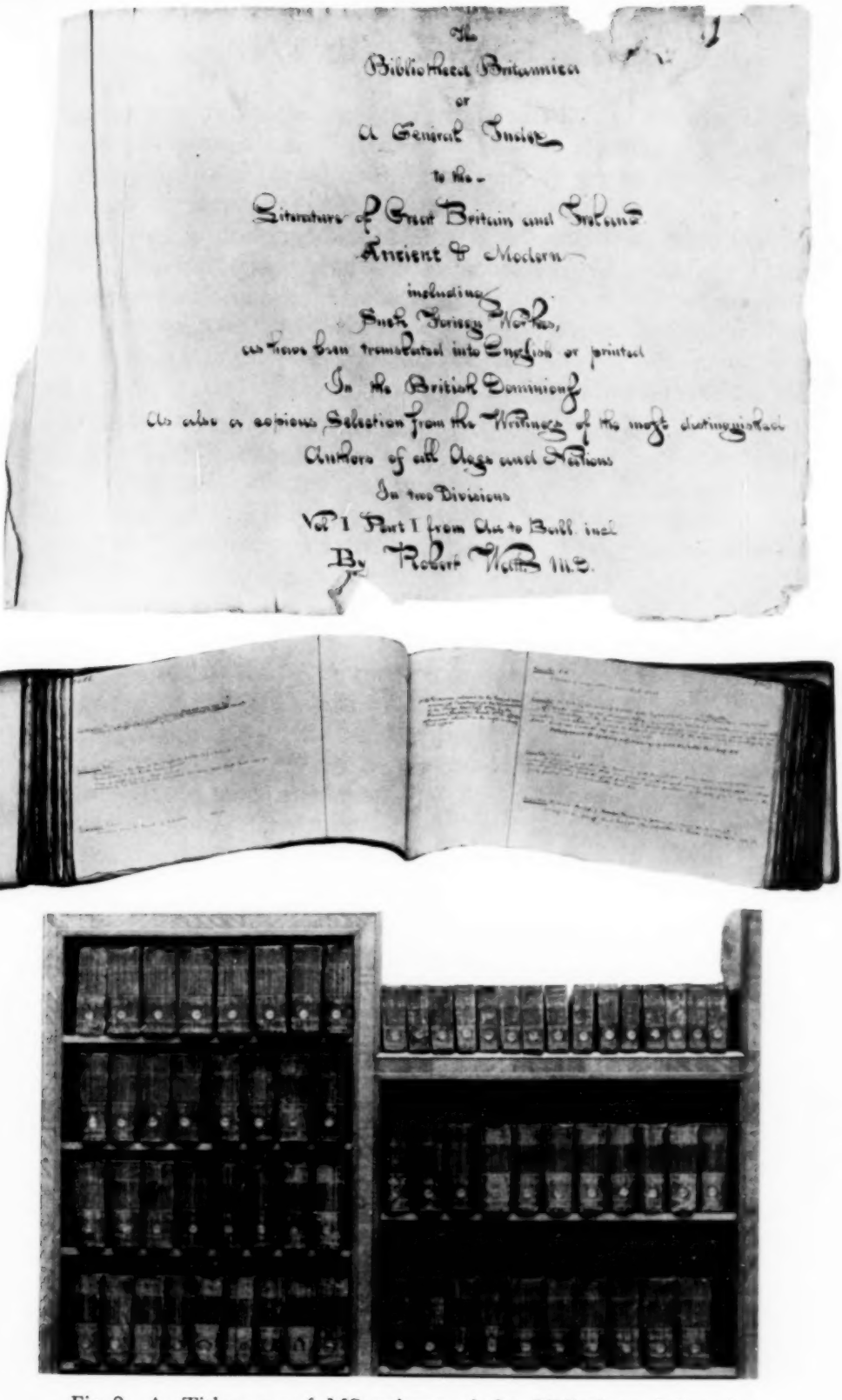

The
Bibliotheca Britannica
or
A General Index
to the
Literature of Great Britain and Ireland
Ancient & Modern
including
Such Foreign Works,
as have been translated into English or printed
In the British Dominions
As also a copious Selection from the Writings of the most distinguished
Authors of all Ages and Nations
In two Divisions
Vol I Part I from Abbot to Bull. incl.
By Robert Watt M.D.

Fig. 2. A. Title-page of MS volume of the *Bibliotheca Britannica*. B. A section of the manuscript. C. Manuscript volumes of the *Bibliotheca Britannica* in the Paisley Public Library.

superhuman tasks he had set himself. Within months of his death, "an armed band of four or five Irish ruffians intent on robbing and with their faces blackened to prevent recognition, invaded that innocent and mournful dwelling house, broke open its recesses, plundered its drawers of all the money and silver plate contained therein and even wrenched off from her [Mrs. Watt's] trembling fingers, with a loaded pistol at her head, the gold marriage rings which her husband had given to her in his best and brilliant days" (Mackenzie, III, 637). Four of the robbers were caught and "thrown off together by Thomas Young the Hangman on 8 November 1820."

Mrs. Watt had been promised £2,000 for the *Bibliotheca* and actually had the bills for that amount when the publishing house of Constable went bankrupt (a bankruptcy which ruined Walter Scott) and she received nothing whatever. This, coming so soon after the robbery, must have been a severe blow to the fortunes of the family.

Watt's eldest son, John, decided to follow in his father's footsteps and matriculated in medicine at Glasgow University from 1822 to 1824, but while still a student, he died at the age of twenty. The surviving son died in 1829. The widow's only income now was her pension of £45 from the Widows' Fund of the Faculty, and this continued until her death in 1856. Only one child survived her, Mary Watt, the youngest daughter. Her fate gives the final turn of the screw to the tragedy of the Watts.

Mary had been well educated and "would have been married to a distinguished member of the Faculty of Physicians and Surgeons but he was cut off by Typhus fever and with him her earthly hopes fled" (Mackenzie, III, 639). Shortly afterwards she became insane and was confined in Govan Parish Lunatic Asylum where she died on 17 April 1864.

Ironically enough, 45 years after Robert Watt's death, the public conscience had begun to stir about the way his family had been treated, but it was too late. In the *Glasgow Saturday Post* of 4 June 1864, we read: "Miss Watt, the only surviving child of the greatest British bibliographer, Dr. Watt, has lately died at Glasgow in a workhouse. Last year a petition was presented to Lord Palmerston praying for a grant of £100 a year for the benefit of Miss Watt. The petition was signed by Alfred Tennyson, John Ruskin, Thomas Hunt, George Grote, Sir Frederick Madden, Holman Hunt, Mrs. Gaskell, and many other names of note. An

answer to it was promised in February but none came till last week some days after the death of the poor lady had been announced to one of the Premier's secretaries. Then a fellow secretary wrote to ask if Miss Watt could be supported on £50 a year; if so, that sum might probably be given her."

The Bibliotheca Manuscript

Mackenzie (1868) hinted that he discovered the manuscripts of the *Bibliotheca* in Miss Watt's effects after her death. "We paid a visit to that asylum the other day, our object being to seek some relics of her amiable and accomplished father. We are rejoiced to say that we found what we sought and they are indeed precious relics." These "precious relics" were presumably the manuscripts which, Finlayson records, were found as slips of paper, bundled up without apparent order in two large sacks. At the sale of her effects by the parochial authorities, the sacks were purchased on behalf of Paisley by a Dr. Richmond who was empowered to do so by Thomas Coats, Esq. In the Transactions of the Paisley Philosophical Institute of 13 December 1870, there is a note that Mr. Thomas Coats had contributed the original MS. of Watt's *Bibliotheca Britanica* (*sic*) in 69 volumes to the library; they remain there to this day (Fig 2).

Mary Watt died in 1864, and presumably her effects were sold shortly afterwards. Between this date and 1870 the loose slips of paper had been sorted into order and bound by Parland of Paisley. We have been unable to trace any record of who was responsible for this painstaking work. The manuscript of the *Bibliotheca Britannica* in Paisley Public Library has been well looked after and recently rebound. Not all the entries have survived the vicissitudes of the Watt family, T to Z being missing. There is also a duplication of M to P. The gargantuan task of Watt can best be judged by inspection of these volumes.

Portraits

Two portraits of Watt are extant and both are in the Royal Faculty of Physicians and Surgeons. That referred to in the opening paragraph of this paper was at one time attributed to Henry Raeburn and certainly is of his school. Cordasco's reference to Reynolds is a *lapsus calami,* for Watt was only eighteen years of age when Reynolds died. This portrait was presented to the Faculty by Alexander Whitelaw on 5 July 1869, after Dr. Lyon had drawn attention to its existence. The other is noted in the

minute of a Faculty meeting on 6 April 1868. Mr. Kirkwood, Inspector of Poor to the Parish of Govan (where Mary Watt died), authorised delivery to the Faculty of a portrait of Robert Watt by Tannoch of Kilmarnock. The authenticity of this work was certified by John Ker, writer.

Thus are recorded the melancholy life of Robert Watt and the sad extinction of the Watt family. To the bibliographer his achievement was massive and his work enduring. To the physician he appears clouded in the same lack of rational thinking as his contemporaries but no worse than they and, when he turned to statistics, he used his logical mind to advantage without prejudging the issues involved. His portrait does not belie him; he served his profession and his fellowmen with intelligence and integrity.

References

CHAMBERS, R. *Lives of illustrious and distinguished Scotsmen.* Glasgow, Blackie, 1841.

CORDASCO, F. *A bibliography of Robert Watt, M.D.* New York, Kelleher, 1950. 27 pp. & facsim. 68 pp.

DUNCAN, A. *Memorials of the Faculty of Physicians and Surgeons of Glasgow.* Glasgow, Maclehose, 1896. 307 pp.

FINLAYSON, J. *An account of the life and works of Dr. Robert Watt.* London, Smith, Elder, 1897. 46 pp.

FINLAYSON, J. Medical bibliography and medical education: Dr. Robert Watt's Library for his medical students in 1812. *Edinb. med. J.*, 1898, *4*, 344-348.

GOODALL, A. L. Robert Watt, physician and bibliographer. *Proc. roy. Soc. Med.*, 1961, *54*, 809-812.

GOODALL, A. L. and GIBSON T. The life and work of Dr. Robert Watt. *Rep. Proc. Scottish Soc. Hist. Med.*, 1958-1959, pp. 23-24.

MACKENZIE, P. Old reminiscences of Glasgow and the West of Scotland. (Vol. III, pp.633-640). Glasgow, Tweed, 1868. 640 pp.

(MASON, T.) A bibliographical martyr—Dr. Robert Watt, author of the *Bibliotheca Britannica. The Library*, 1889, *1*, 56-63.

New statistical account of Scotland. Edinburgh, Blackwood, 1845. Vol. V (Ayr-Bute), pp. 730-731.

REVIEW of cases of diabetes, consumption etc., with observations on the history and treatment of disease in general. *Edinb. med. surg. J.*, 1809, *5*, 85-98.

SHELDRAKE, T. Letter. *Med. phys. J., Lond.*, 1800, *4*, 192-200.

———. Letter. *Ibid.*, 493-498.

———. Letter. *Ibid.*, 1801, *5*, 9.

———. Letter. *Ibid.*, 264-270.

———. Letter. *Ibid.*, 456-467.
———. Robert Watt (1774-1819). *In*: Lee, S., Ed. *Dictionary of national biography*, London, Smith, Elder, 1899, vol. 60, pp. 63-64.
WATT, R. Description of a new instrument for operating on the stone. *Med. phys. J., Lond.*, 1800, *3*, 195-198.
———. Description of a new machine for curing distorted limbs. *Ibid.*, 1800, *4*, 93-97.
———. Letter. *Ibid.*, 498-503.
———. Letter. *Ibid.*, 1801, *5*, 119-120.
———. Letter. *Ibid.*, 426-430.
———. Letter. *Ibid.*, 430-432.
———. *Cases of diabetes, consumption, etc., with observations on the history and treatment of disease in general.* Paisley, Constable, 1808.
———. Observations on the treatment of diabetes. *Edinb. med. surg. J.*, 1809, *5*, 287-298.
———. Extract of letters. *Ibid.*, 1811, *7*, 241-243.
———. *Catalogue of medical books for the use of students attending lectures on the principles and practice of medicine.* Glasgow, Smith, 1812, 72 pp.
———. *Treatise on the history, nature and treatment of chincough.* Glasgow, Smith, 1813. 392 pp.
———. Observations on the influence of vaccination on other diseases and on the population in general. *Edinb. med. surg. J.*, 1814, *10*, 168-178.
———. Cases of periodical jacitation or chorea. *Med.-chir. Trans.*, 1814, *5*, 1-23.
——— [Anon.]. *Rules of life.* Edinburgh, Longman, 1814.
———. On the formation of the rainbow. *Ann. Philos.*, 1819, *13*, 131-133
———. *Bibliotheca Britannica or a general index of British and foreign literature.* Edinburgh, Constable, 1824.

MANUSCRIPTS

Minutes of Paisley Medical Society. *In Paisley Public Library.*
Minutes of Royal Faculty of Physicians and Surgeons. *In Royal Faculty Library.*
Essays of the Glasgow Medical Society. *In Royal Faculty Library.*
Bibliotheca Britannica. *In Paisley Public Library.*
Treatise on the history, nature and treatment of chincough. *In Royal Faculty Library.*

A Note on the Early Relationship Between Georges Cuvier and Louis Agassiz

WILLIAM COLEMAN*

THIS essay attempts to clarify the beginning of the personal relationshp between Louis Agassiz and Georges Cuvier. Using new material from the Cuvier archives in Paris, it seeks to rectify a misleading account of the beginning of this relationship presented in a recent biography of Agassiz. This material, reproduced below, suggests that the initial bond between the two men was a common interest in the natural history of the living and fossil fishes—the subject of Agassiz's first scientific study.**

Among the numerous exploratory expeditions which departed from Europe after the re-establishment of maritime peace following the close of the Napoleonic wars was that which carried two Munich naturalists, Johann Baptiste von Spix, zoologist, and Karl Friedrich Philipp von Martius, botanist, into tropical Brazil. Returning to Europe in 1820 after three years spent assembling enormous collections of the flora and fauna of the Amazon river basin, the two naturalists directed their efforts towards the description and classification of these specimens. A general narrative of the expedition was published in 1823, and Spix, prior to his death in 1826, had been able to prepare three volumes in which he described the new species of simians, reptiles, and birds which had been discovered. He had unfortunately not been able to do the same for the many novel fish species which were found, and von Martius, unable to do this himself, had also failed to find any other naturalist sufficiently qualified to perform the task.

Georges Cuvier was at this time at the peak of his international renown. During the previous quarter century he had published works on comparative anatomy, paleontology-geology, and general zoological systematics and was widely considered as the arbiter of natural history. After the publication in 1817 of the five volumes of the *Règne animal,* he and his new collaborator, Achille Valenciennes, devoted their full energies to the preparation of what would become Cuvier's largest and perhaps most representative work, the *Histoire naturelle des poissons,* eight volumes

* Baltimore, Maryland.

** I wish to thank Miss R. Rappaport and Mr. G. Basalla for their assistance in the preparation of this article.

of which appeared before his death in May 1832. Following his usual custom, Cuvier solicited the assistance of naturalists throughout Europe, requesting specimens or, should this be impossible, accurate and complete descriptions of all known fishes. The new natural history of the fishes was planned to be the greatest compendium of information on this class ever assembled.

From Munich, von Martius sent to Cuvier, whose personal acquaintance he had made during a visit to Paris in 1826, the more than seventy plates which Spix had prepared for his unfinished work, and Cuvier replied by sending a detailed comparison of these species with those listed in the *Règne animal*, together with a copy of the *Prospectus* of the natural history of fishes, to his friend.[1] In the same month that this letter was written, the young Louis Agassiz arrived in Munich to complete his medical training.

Louis Agassiz had already behind him several years of distinguished studies at Lausanne, Zürich, and Heidelberg and he hoped to devote as much attention as possible to the continuation of his zoological investigations.[2] He was quickly recognized as a most promising student by the Munich naturalists Ignatius Döllinger, an embryologist in whose home he found lodgings, and von Martius. Agassiz had long been interested in the fishes and in Munich he seriously undertook a detailed review of the natural history of the fresh water fishes of central Europe. Thus, in the spring of 1828, von Martius, remembering Cuvier's pleas, proposed that Agassiz complete the study of the Brazilian fishes, an offer which the Swiss naturalist eagerly accepted. "I could not better launch myself in the scientific world," he said, "than by sending Cuvier my fishes"; indeed an excellent estimation of the situation.[3]

The work was completed in May 1829 and a copy was soon sent to Paris. In a clever gesture, the work was dedicated to Cuvier and reached the Muséum at Paris probably in early July, accompanied by a letter from von Martius. Before requesting that Cuvier bring the volume to the attention of the Institut, and thus increase its distribution, he remarked:

I have the honor to present to you the first part of the work of the late M. Spix on the Brazilian fishes, with the descriptive work of M. Agassiz, from the Orbe [Valley] in Switzerland. M. Agassiz and I have presumed to dedicate to you, Sir, this work of my friend Spix who, without doubt,

1 Cuvier to von Martius, 7-xi-1827; Agassiz Papers, Houghton Library.
2 Edward Lurie, *Louis Agassiz, A life in science*. Chicago, 1960, pp. 13-30.
3 Quoted by Lurie (note 2), p. 39.

had he lived, would have found terms more appropriate to express to you the limitless gratitude which animates all those who know how to appreciate what you have done for the present and the future.[4]

It seems not unreasonable to believe that this is the first knowledge of Agassiz to reach Cuvier. A previous letter from von Martius, included with a dispatch containing the volumes of the Brazilian travel narrative, makes no reference to Agassiz.[5] It is possible that Cuvier was aware of Agassiz's first scientific memoir, a description of a new species of carp published in Lorenz Oken's *Isis* for 1828-1829, but this small contribution would certainly have meant far less to him than a definite citation and, subsequently, recommendation from his friend von Martius.

Later in the summer of 1829 Agassiz himself addressed his first letter to Cuvier, in which he tells of the aims of his study of the Brazilian fishes, the difficulties which beset him during its preparation, and of plans for the investigation of the central European fresh water fish fauna.[6] The tone of the introductory paragraph of this letter seems to permit no other interpretation than that this is the first direct communication from Agassiz to Cuvier. Very wisely and perhaps at the suggestion of von Martius, Agassiz relates here his great intellectual indebtedness to the French naturalist whose "superior genius" had "inspired" his "taste for the scientific study of nature" and had given him "strength to overcome all difficulties" in this arduous occupation.

There exists in the Agassiz Papers a seven-page manuscript sketch, dated by Lurie April 1829,[7] in which one finds a text singularly different from that of the letter of July 1829, described above. In the latter, except for the flattering first paragraph where Cuvier is himself the center of attention, Agassiz confines his discussion to work completed and that about to begin. In the former letter, however, he speaks of his formal academic training, his experience in practical zoological work, and his primary ambition: to join an exploratory expedition as naturalist. He then requests Cuvier's advice as to whether the continuation of his medical training would be the proper training for a professional

[4] "J'ai l'honneur de vous présenter ci-joint la première partie de l'ouvrage de feu M. Spix sur les poissons de Brésil, avec le travail descriptive [sic] de M. Agassiz (de l'Orbe en Suisse). M. Agassiz et moi, nous avons osé de dédier a vous, Monsieur, cet ouvrage de mon ami Spix, qui, sans doute, s'il avait resté plus longtemps sous les vivants, aurait trouvé des termes plus dignes de vous exprimer cette reconnaissance sans bornes qui anime tous ceux qui savent apprécier ce que vous avez fait pour le présent et pour la posterité." von Martius to Cuvier, 29-vi-1829; IFfc [= Institut de France, fonds Cuvier] 251 (39).

[5] von Martius to Cuvier, 3-v-1828; *IFfc 250(36)*.

[6] Letter *A*. Agassiz to Cuvier, 5-vii-1829; *IFfc 251(3)*.

[7] *Op. cit.* (note 2), p. 393, n. 18.

career as a naturalist. "It is you, Sir," he concluded, "that I beg to be my guide; please do not repulse someone who wishes to take shelter under your wings."[8]

The evidence suggests that this letter was never sent to Cuvier. No copy of it exists in the very complete *fonds Cuvier* at the Institut de France as would be expected had it been received. More convincing, however, is the fact that just two months after the presumed date of this sketch Agassiz sent Letter *A* to Paris. Despite their great difference in content, the object of the two letters is essentially the same: to give Cuvier knowledge and, hopefully, favorable appreciation of his hitherto unknown disciple. It is highly unlikely that Agassiz would have sent two such similar letters within so short a period of time. Whereas Letter *B* is little more than a review of Agassiz's personal history, Letter *A* is confined to Cuvier and to icthyology. One can only guess at the reason for this change. Agassiz had undoubtedly learned, very probably from von Martius who, it will be recalled, knew Cuvier well, that the latter had a difficult personality. Anyone who wished to enjoy Cuvier's favor could not wish to begin better than by offering a positive contribution, however modest, to natural history. Here, of course, Agassiz's position was ideal; not only was his first book an excellent example of scientific investigation but it also was concerned with Cuvier's preferred class of animals. Agassiz could scarcely have failed to be called to Cuvier's attention. A letter, nevertheless, such as Letter *B*, would probably have evoked no more than passing interest. Cuvier was in no way uninterested in his own reputation; he was, in fact, notorious for his ambition and his egoism. Agassiz's rather naïve letter, in which Cuvier becomes a secondary figure in comparison to an almost unknown Swiss student, would probably have brought forth only a very indifferent response from the Muséum. Letter *A*, on the other hand, possessed a more appropriate form and soon brought Agassiz an encouraging reply (Letter *C*).

Thus Letter *B*, so revealing of the youthful Agassiz's studies and aspirations, appears not to have reached Cuvier. Its opening sentence ("Before finishing my letter, Sir, permit me to ask your advice. . . .") suggests that the entire sketch was designed as a postscript, perhaps to Letter *A*. If this is true, it too may be dated July 1829.

[8] "C'est vous, Monsieur, que je veux prier d'être mon guide; veuillez ne pas repousser un qui vient s'abriter sous vos ailes." Letter *B*. Agassiz Papers, Houghton Library. See *Louis Agassiz, his life and correspondence*, E. C. Agassiz, Ed. Boston, 1888, I, pp. 104-108 for an English translation of this letter sketch.

Cuvier's response to the joint dedication and to the letters from von Martius and Agassiz was prompt and appreciative.[9] To Agassiz he confesses his pleasure that a work of such high quality as the study of the Brazilian fishes, the plates and descriptions for which are found to be of great beauty and exactitude, should have been dedicated to him. Both the *Histoire naturelle des poissons* and the *Règne animal,* the second edition of which was then in preparation, would, he continued, immediately benefit from the new volume. Finally, Agassiz is encouraged in his study of the fishes from the Alps, meaning presumably the fishes of central Europe. Certainly Agassiz could not have anticipated a more pleasing and stimulating reaction from his elected master.

Only one other letter reached Cuvier from Agassiz before the latter finally found himself in Paris. In September 1830, having returned to Munich from a prolonged visit in Switzerland, he apologizes to Cuvier that in his absence most of his duplicate specimens had been lost and that the Muséum must therefore wait until the collection could be re-formed. He also announces, by *Prospectus,* his plans for a natural history of the central European fishes.[10]

In the late spring of 1829 Agassiz had taken his doctorate of philosophy in natural history and a year later he won his second degree, the doctorate of medicine, which had been the ostensible reason for his university studies. Even before he had finished his examinations he had begun the study of a new subject, paleontology. Here again he was following the path of Cuvier who, in the *Recherches sur les ossements fossiles* (1812), had established the investigation of fossil organic remains as a rigorous and serious scientific discipline.[11] Three of the four vertebrate classes occupied Cuvier, the mammals, birds, and reptiles (which then included the amphibians). He was also interested in fossil fishes but had had no opportunity to study the group sytematically and contented himself to augment, like all other parts of the collection, the number of specimens of these creatures which the Muséum possessed.

Agassiz began his own investigation by visiting the relevant collections of fossil fishes in Vienna. He suspected that this study

[9] Letter *C.* Cuvier to Agassiz, 3-viii-1829; Agassiz Papers, Houghton Library. English trans. in *Louis Agassiz,* (note 8), I, pp. 114-115.

[10] Letter *D.* Agassiz to Cuvier, 15-ix-1830. *IFfc 252(1).*

[11] Agassiz's first readings in paleontology, nevertheless, appear to have been the works of the German savant, Goldfuss, which he studied at Heidelberg. Cf. *Louis Agassiz* (note 8), I, p. 149.

would lead to great achievements, all ". . . the more so because Cuvier, who alone could do it (for the simple reason that every one else has till now neglected the fishes), is not engaged upon it."[12] His enthusiasm and activity proved successful for, when he arrived at Paris and both he and Cuvier discovered that they were engaged in the same occupation, Cuvier, acknowledging the superiority of the younger naturalist in this field, placed at Agassiz's disposition all of his notes and collections.[13]

Leaving Switzerland in October 1831, Agassiz began a tour of natural history museums which would ultimately take him to Paris. He passed first by Strasbourg where he was warmly received by Georges-Louis Duvernoy, physician and naturalist, a native of Cuvier's home city, Montbéliard, and a relative and very close friend of Cuvier himself. He then traveled in Germany, first to Stuttgart, then to Heidelberg, and finally Karlsruhe. This rapid journey ended in Paris in December 1831.

In spite of the previous correspondence, Agassiz had decided to seek letters of introduction to Cuvier. Two of these have been preserved, one of them no more than a reminder, the other a brief but extremely perspicacious estimate of the young naturalist. Von Martius is content to recall Agassiz's contribution to the Brazilian fish studies. Agassiz and his traveling companion, Alexander Braun, a botanist and his future brother-in-law, received the following introduction:

> I take the liberty with these lines to introduce to you two young naturalists, M. Agassiz, from the Orbe [Valley] in Switzerland, and M. Alexander Braun, from Karlsruhe in Baden. The benevolence with which you [know how] to honor my compatriots will doubtlessly be again conferred upon these two naturalists, both of whom have real merits and who, now under your direction, will be able to fulfill all the expectations which they have known so well how to excite.[14]

The second introduction was from Duvernoy and was sure to receive Cuvier's highest regard. It is undated, but probably was written during Agassiz's sojourn in Strasbourg in the fall of 1831, perhaps October or November of that year. Duvernoy wrote:

12 Quoted by Lurie, *op. cit.* (note 2), p. 49.

13 *Ibid.*, pp. 56-57.

14 "Je prends la liberté d'introduire auprès de vous par ces lignes deux jeunes naturalistes, M. Agassiz, de l'Orbe en Suisse, et M. Alexandre Braun, de Carlsruhe en Bade. La bienveillance de laquelle vous [savez] honorer mes compatriotes, sera sans doute conferée de votre part sur ces deux naturalistes, lesquels ont de vrais mérites, et qui, maintenant sous vous [sic] yeux, pourront remplir toutes les espérances qu'ils sont sû si bien exciter." von Martius to Cuvier, 14-xii-1831; *IFfc 253(36)*.

It is doctor Agassiz who brings you this letter. He is certainly, in spite of his youth, one of your most intelligent admirers. I have been able to ascertain from the few conversations that we have had together how much he appreciates your great learning and the genius which animates it and how much on this subject he is in accordance with my feelings and viewpoint. . . . I believe that M. Agassiz can be very useful to you. He seeks a publisher for his [work on] fossil fishes; I suppose that his scholarship is beginning to be exhausted or that his father is growing tired of providing for his expenditures. Cannot the *Académie* assist him in the publication of this handsome work, the drawings for which he will show you? This young man works 14 to 16 hours out of 24. He seems to me gentle, forthright, of good faith, [and] born with an instinct for natural history. He will go far indeed if he can continue to devote himself to its study.[15]

But Agassiz's good fortune was soon ended. Within six months of his arrival in Paris, Cuvier was dead and in September 1832 Agassiz returned to Switzerland. This brief first visit was nevertheless successful.[16] Cuvier had introduced him to the professors at the Muséum and had also permitted him to study the institution's renowned collections, especially those of fossil fishes. Agassiz met Alexander von Humboldt and attended Cuvier's final series of lectures, a general history of the sciences which attempted to demonstrate the superiority of empirical, "positive" science to speculative, quasi-metaphysical science, the basic texts of which, works by Kielmeyer, Schelling, and Oken, Cuvier knew as well as Agassiz. It was truly a period of ". . . significant intellectual development for Agassiz."[17]

Agassiz was a young man in his early twenties when he first wrote Cuvier. The marks of esteem which the aging naturalist accorded the eager student doubtlessly had many motives. Disinterested concern for a serious and promising youthful naturalist, the desire to employ Agassiz's good will and knowledge in the preparation of the *Histoire naturelle des poissons*, and a quite natural desire to extend further his personal influence all contributed to the reception which Agassiz received. Cuvier's initial hesitation was lost when he discovered the extent of his admirer's

15 "C'est M. le docteur Agassiz qui vous remettra cette lettre. Il est certainement, malgré son jeune âge, un de vos admirateurs les plus sages. J'ai eu l'occasion d'apprendre, dans le peu d'entretiens que nous avons eus ensemble combien il apprécie votre vaste science et le génie qui l'anime et combien il s'accorde en cela avec mes sentiments et ma manière de voir. . . . Je crois que M. Agassiz pourrait vous être bien utile. Il cherche une Librairie pour ses poissons fossiles; je présume que sa bourse commence à s'épuiser ou que son père commence à se lasser de fournir à ses dépenses. L'Académie ne pourrait-elle pas l'aider dans la publication de ce bel ouvrage dont il vous montrera les dessins? Ce jeune homme travaille 14 à 16 heures dans 24. Il me paraît doux, honnête, de bonne foi, né avec l'instinct de l'histoire naturelle. Il ira bien loin s'il peut continuer de s'y livrer." Duvernoy to Cuvier, n.d.; *IFfc 253 (60)*.

16 See *Louis Agassiz* (note 8), I, pp. 167-181.

17 Lurie (note 2), p. 57.

learning and practical experience, and the relationship soon acquired considerable cordiality. Agassiz's subsequent career, reviewed in Lurie's admirable biography, often found him engaged, like Cuvier before him, in innumerable non-scientific occupations. His intellectual ideal, nevertheless, always remained the Parisian naturalist whose works had introduced him to natural history and who had received the first public acclamation he had given, the dedication which he and von Martius joined to the descriptions of the Brazilian fishes. The correspondence reproduced here thus represents the first contact between a famous master and an equally honored pupil.

CORRESPONDENCE

Letters *A* and *D*, plus the passages from letters from von Martius and Duvernoy cited above, are all preserved in the Bibliothèque de l'Institut de France, fonds Cuvier, Paris. Letters *B* (not reproduced here) and *C* are in the Agassiz Papers, Houghton Library, Cambridge, Massachusetts. The Librarian of the Bibliothèque de l'Institut de France and the Director of the Museum of Comparative Zoology, Cambridge, Massachusetts, have kindly permitted reproduction of the letters here.

Letter *A*

[Agassiz to Cuvier, 5-vii-1829]

Honorable Sir,

If I have presumed to add my name to that of M. de Martius in the dedication that he has made to you of the [work on] fossil fishes brought back from Brazil by M. de Spix and whose description has been confided in me, it is because I hope that you will pardon a young man for the desire to direct his first writings to him to whom he owes the little that he has acquired. Yes, Sir, they are your works which have awakened in me the taste for a scientific study of nature; in reading them I was inspired by a commanding genius which gave me the strength to overcome all the difficulties that such a study offers when one lacks the necessary aid. How much I then envied those who had the good fortune to develop under your direction and to examine the immense collections that you have formed. Would that I soon might share all of these advantages!

The aim of my work on the fishes from Brazil was to provide descriptions as exact as possible of the *species* in all of their relationships, considering their scales, their fins, and the proportions between the parts, etc., and to give to the *genera* constant anatomical characters. From the latter point of view I have had to struggle with great obstacles, often having had to utilize the specimens preserved in alcohol and a collection composed of only a very small number of skeletons. This is also the reason for the delay of the anatomical tables that I have added to the drawings of M. de

Spix. Some tables have had to be prepared anew with greater care, and I have also had several new ones made.

In reading your *Histoire naturelle des poissons,* Sir, I felt how much my own work failed to attain the end which I had proposed for it and I therefore beg you to judge with indulgence my first work. No one knowing better than you, Sir, the circumstances which have attended its birth and the manner in which it has been executed, would it be indiscrete to request that you announce it in the journals?

I must offer you my excuses, Sir, for not yet having sent you the fish from our land, as M. de Martius had told you that I intended to do. The desire to make this collection as complete as possible and a rather extended illness this spring, during which the number of my duplicates was reduced, have delayed their dispatch until the present. I dare to believe that among the species that I am going to send to you there will be some which you do not possess; among others, two new species, one related to *Cyprinus gobio,* the other to *Cyprinus aspinus* or, rather, intermediate between it and *Cyprinus alburnus.*

Having had the opportunity in my youth to observe the fish of the Swiss lakes, then those of Bavaria, as well as the other parts of Germany, including the Rhineland, I propose to publish their natural history, accompanied by anatomical illustrations and plates colored with the greatest care, since those of Bloch are too inexact to be valid in the present state of icthyological science.

Be assured, Sir, of the great esteem with which I regard being your most humble servant.

Munich, 5 July 1829

LOUIS AGASSIZ, Doctor

Letter *C*

[Cuvier to Agassiz, 3-viii-1829. Translation from *Louis Agassiz,* E. C. Agassiz, Ed., pp. 114-115.]

Sir,

You and M. de Martius have done me honor in placing my name at the head of a work so admirable as the one you have just published. The importance and the rarity of the species therein described, as well as the beauty of the figures, will make the work an important one in icthyology, and nothing could heighten its value more than the accuracy of your descriptions. It will be of the greatest use to me in my History of Fishes. I had already referred to the plates in the second edition my "Règne Animal." I shall do all in my power to accelerate the sale among amateurs, either by showing it to such as meet at my house or by calling attention to it in scientific journals.

I look with great interest for your history of the fishes of the Alps. It cannot but fill a wide gap in that portion of natural history—above all,

in the different divisions of the genus Salmo. The figures of Bloch, those of Meidinger, and those of Marsigli, are quite insufficient. We have the greater part of the species here, so that it will be easy for me to verify the characters; but only an artist, working on the spot, with specimens fresh from the water, can secure the colors. You will, no doubt, have much to add also respecting the development, habits, and use of all these fishes. Perhaps you would do well to limit yourself at first to a monograph of the Salmones.

With my thanks for the promised documents, accept the assurance of my warm regard and very sincere attachment.

B. G. CUVIER

Jardin du Roi, at Paris, 3 August 1829

Letter *D*

[Agassiz to Cuvier, 15-ix-1830]

Monsieur le Baron,

A nervous illness from which I have suffered this past year and following which I was compelled to pass several months in Switzerland without daring to touch my collections preserved in alcohol has brought about the loss of almost all the fish-duplicates that I had collected with the intention of sending some original examples to the large Museums. Since my return to Munich I have again taken up this work and have collected with the same aim as before a large number of species, some of them new, but several are still missing and, intending for your Museum a complete collection of our fishes, I am obliged again to suspend this shipment, perhaps even until spring. In the meantime I have the honor, Sir, to send you the announcement of my book accompanied by several proof plates. They do not yet correspond to what I propose to present; they are equally the proofs of the engravers and the colorists. The drawings are considerably better and the first *cahier,* which will contain the beginning of the Cyprinides, is infinitely better engraved. My publisher has done me a kindness by joining these first plates to the announcement so that they will not be entirely valueless. They will be engraved *de nouveau* for the work; please judge them for this point of view.

In order to publish my observations on the salamanders I want to wait until next autumn, [since] from now until then I shall be able to compare, in the field, the species from Brandenburg.

In a few weeks I shall have the pleasure of sending you the second and final portion of the [study of] Brazilian fishes.

I have the honor to be, Sir, with the most profound respect, your most humble and obedient servant.

DR. LOUIS AGASSIZ

Munich, 15 September 1830

Letter *A*

[Agassiz to Cuvier; 5-vii-1829]

Très honoré Monsieur,

Si j'ai osé joindre mon nom à celui de Monsieur de Martius dans la dédicace qu'il vous a faite des poissons rapportés du Brézil par M. de Spix et dont la description m'a été confiée, c'est que j'espère que vous pardonnerez à un jeune homme l'ambition de vouer ses prémices littéraires à celui auquel il doit le peu qu'il a acquis. Oui, Monsieur, ce sont vos ouvrages qui m'ont inspiré le goût d'une étude scientifique de la nature; en les lisant je me sentais inspiré par un génie supérieur qui me donnait la force de surmonter toutes les difficultés qu'offre une semblable étude lorsqu'on manque des secours nécessaires. Combien alors j'enviait ceux qui ont le bonheur de developper sous vos yeux et de parcourir les immenses collections que vous avez formées. Puisse-je bientôt partager tous ces avantages!

Le but que je me suis proposé dans mon travail sur les poissons du Brézil était de donner des descriptions aussi exactes que possibles des *espèces* sous tous leurs rapports, quant aux écailles, aux nageoires, et aux proportions des parties entr'elles, etc. et de donner aux *genres* des caractères anatomiques constants. Sous ce dernier point de vue j'ai eu à lutter avec des grands obstacles, ayant souvent dû ménager les exemplaires conservés dans l'esprit de vin et le cabinet ne possèdant qu'un très petit nombre de squelettes. C'est aussi là la cause de retard qu'ont éprouvé les tables anatomiques que j'ai jointes aux dessins de M. de Spix. Quelques tables ont dû être dessinées derechef avec plus de soin, comme j'en ai aussi fait faire quelques nouvelles.

En lisant votre Histoire naturelle des poissons j'ai senti, Monsieur, combien il manquait à mon travail pour atteindre le but que je m'étais proposé, aussi je vous prie modestement de bien vouloir juger avec indulgence le premier essai. Personne ne connaissant mieux que vous, Monsieur, les circonstances qui lui a donné naissance et la manière dont il a été executé, n'y aurait-il pas d'indiscrétion de vous prier de l'annoncer dans le bulletin?

Je dois, Monsieur, vous faire des excuses de ce que je ne vous ai pas encore expédié les poissons de nos contrées, comme M. de Martius vous a annoncé que j'en avais l'intention; mais le désir de rendre cette collection aussi complette que possible et une maladie assez longue que j'ai fait ce printemps et pendant laquelle [la] quantité des mes doubles se sont gatées [sic] en ont retardé l'envoy jusqu'ici. J'ose croire que parmi les espèces que je vous enverrai il y aura quelques espèces vous ne possèdez pas, entr'autres deux espèces nouvelles, l'une voisine de Cyprinus gobio, l'autre de Cyprinus aspinus ou plutôt intermédiaire entre lui et Cyprinus alburnus.

Ayant eu occasion d'observer de ma jeunesse les poissons des lacs en Suisse, puis de la Bavière ainsi que de divers autre contrées de l'Allemagne,

p. ex. du Rhin, je me propose d'en publier l'histoire naturelle accompagnée de planches anatomiques et de planches coloriées avec le plus grand soin, car celles de Bloch sont inexactes pour qu'elles puissent suffire dans l'état actuel de la science icthyologique.

Agréez, Monsieur, l'assurance de la plus haute consideration avec laquelle j'ai l'honneur d'être Votre très humble serviteur.

LOUIS AGASSIZ, Docteur

Munic, le 5 juillet 1829

Letter *C*

[Cuvier to Agassiz, 3-viii-1829]

Monsieur

Vous m'avez fait beaucoup d'honneur, ainsi que M. Martius, en plaçant mon nom à la tête d'un recueil ainsi precieux que celui que vous venez de publier. L'importance et la rarité des espèces qui y sont decrites, et la beauté des figures en feront un ouvrage important pour l'Icthyologie, et rien ne pouvait autant ajouter à son prix que l'exactitude des descriptions que vous y avez jointes. Il me sera de la plus grande utilité pour mon histoire des poissons, et déja j'en avais cité les planches dans la 2^me^ édition de mon règne animal. Je ferai encore mon possible pour en accélérer le débit parmi nos amateurs, soit en le faisant voir à ceux qui se réunissent chez moi, soit en le faisant parler dans les recueils scientifiques.

J'attends avec un grand interêt votre histoire des poissons des alpes. Elle ne peut que remplir un grand vide dans cette partie de l'histoire naturelle, surtout pour les differentes divisions du genre Salmo. Les figures de Bloch, celles de Meidinger, celles de Marsigli sont toutes insuffisantes. Nous avons bien ici la plupart des espèces en sorte que pour les formes il me sera facile d'en rectifier les caractères, mais pour les couleurs il n'y a qu'un peintre travaillant sur les lieux et d'après le poisson sortant de l'eau qui puisse les fixer. D'ailleurs vouz aurez sans doute beaucoup à ajouter sur le developpement, les moeurs, et les usages de tous ces poissons. Peut-être feriez-vous bien de vous en tenir d'abord à une monographie des Salmones?

Agréez, je vous prie, avec mes remerciements pour les documents que vous me faites et l'assurance de ma haute estime et de mon attachement bien sincère.

B[aron] G. CUVIER

au Jardin du Roi a Paris, le 3 août 1829

Letter *D*

[Agassiz to Cuvier, 15-ix-1830]

Monsieur le Baron,

Une maladie nerveuse que j'ai sufferte l'an passé et après laquelle j'ai dû passer quelques mois en Suisse sans oser toucher aux mes collections conservées dans l'esprit de vin, m'a occasioné la perte d'à peu près tous les

doubles de poissons que j'avais recueillis dans le but de communiquer aux grands Musées des exemplaires originaux de mes poissons de l'eau douce. Depuis mon retour à Munic j'ai repris cet ouvrage et recueilli dans le même but que précedemment un grand nombre d'espèces, parmi lesquelles plusiers nouvelles; mais il m'en manque encore plusiers et destinant à votre Musée une collection complette de nos poissons, je suis obligé de suspendre encore cet envoy peut-être même au printemps. En attendant, j'ai l'honneur, Monsieur, de vous addresser l'annonce de mon livre accompagné de quelques planches d'épruve. Elles ne répondent pas encore à ce que je me propose de donner; ce sont également les épreuves des graveurs et des coloristes. Les dessins sont bien supérieurs et le premier cahier qui contiendra le commencement des Cyprins est infiniment mieux gravé. Ma librairie a voulu me faire une gentillesse en joignant à l'annonce ces premières planches pour qu'elles ne doivent pas tout à fait inutiles. Elles seront gravées derechef pour l'ouvrage; veuillez donc les juger sous ce point de vue.

Pour publier mes observations sur les salamandres, je veux attendre l'automne prochain; d'ici là j'aurai pu comparer sur les lieux les espèces du Brandebourg.

Dans quelques semaines j'aurai le plaisir de vous adresser la 2^{d} et dernière livraison des poissons du Brésil.

J'ai l'honneur d'être, Monsieur, avec le plus profond respect, votre très-humble et très-obéissant serviteur,

Dr. Louis Agassiz

Munic, le 15^{e} 7^{b} 1830

Health Conditions in the Ghetto of Lodz

LEONARD TUSHNET*

LODZ, the second largest city in Poland, with a pre-war population of 700,000 including 233,000 Jews, mostly workers in the textile industry, was occupied early in World War II by the Germans. It was renamed Litzmannstadt, incorporated into the German Reich, and the Nuremberg Laws strictly applied. After a short violent period of looting and pogroms, all the Jews were segregated into one area, the Balut section. This ghetto, the first in Poland, instituted on 8 February 1940, contained 160,400 Jews; it was completely surrounded by walls and barbed wire on 1 May 1940, and the death penalty enforced for leaving the Ghetto without permission.[1]

The Ghetto district had no sewerage system. Most of the houses were old, without plumbing. The Jews, in payment for their labor for the Germans, received scrip redeemable for provisions at the Ghetto administration food stores. Mordecai Chaim Rumkowski, appointed by the Germans as "Eldest of the Jews," was made fully responsible for carrying out their orders and for organization of life in the Ghetto. Rumkowski, the former head of a children's home, an extraordinarily complex individual, felt that co-operation with the Germans could blunt their hostility; in this way, at least some of the Jews would be saved from destruction, above all, the children. He expressed his aims for the Ghetto as "Work, Bread, Care for the Sick, Protection of Children, Order in the Ghetto."[2] His severest critics admitted that he tried his best to improve the miserable health status of the Ghetto.

Even before the Ghetto was closed, a Health Division was organized, under the direction of Dr. Helman, the oldest and most influential Jewish doctor in Lodz.[3] Because of his age, he retired in April 1940 to be succeeded by Dr. Leon Szykier in charge of the medical section and Josef Rumkowski, the "Eldest's" brother, as executive officer. The Health Division was concerned with sanitation and the provision of medical care in hospitals and dispensaries.[4]

* Maplewood, New Jersey.

1 *Dokumenty i Materialy do dziejów okupacji niemieckiej w Polsce.* A. Eisenbach, Ed., Warsaw, 1946, vol. III, pp. 74, 98.

2 Frank, Shlome. *Togbuch fun Lodzher Getto.* Tel Aviv, 1958, p. 256.

3 Jasni, A. Wolf. *Di Geshichte fun Yidn in Lodzh in di yorn fun der Deitsher Yidn-Oisrotung.* Tel Aviv, 1960, p. 155.

4 Frank, pp. 255-258.

The organization of the hospitals and dispensaries was amazing. A separate building division of the administration was charged with remodeling old houses so that they could be used as hospitals.[5] By the end of 1941 there were 1,000 beds in various institutions, filled usually to double their capacity. The largest hospital was on Lagiewnicka Street; others were on Drewnowska, Garbarska, and Mieczkiewicz. The psychiatric hospital was at 8 Wesola Street. In addition to these, a special 300-bed children's hospital was opened on 30 December 1941. Six stations for ambulatory care were also set up. At first, no apparatus of any type was permitted to be brought into the Ghetto; later, some equipment was released to the hospitals and drugs to the dispensaries on the payment of large sums of money.[6] Smugglers helped. A particularly daring exploit was that of Regina Plivolski, who brought in quartz lamps, diathermy and X-ray machines, and sterilizers. Supplies and medicaments were quickly exhausted. Various expedients were used to eke out such materials as antiseptics, gauze, and cotton. New supplies were made by re-working old materials. Quilts, for example, were torn apart and the cotton filler removed to be washed and sterilized. Naturally the number of beds was insufficient for all the sick in the Ghetto. Bribes were given to the administrators for admission slips to the hospitals. Desperately ill patients connived to go home at the risk of their lives so that another sick member of the family could take the vacated bed.

Besides the hospitals and ambulatoria, there was a school health system, run by Drs. Maria Goldberg, Sima Mandel, Esther Olshanetzki, Deborah Rosen, Ethel Goldstein-Pollack, Nusbaum, Kaplovski, Neimark, and Litvin, with the aid of eight nurses.[7]

A great problem was the procurement of doctors. Many had fled to the Soviet Union at the outbreak of the war. Others, deprived of their homes and offices by the Germans, forbidden to practise among non-Jews, subject to arrest and fine on specious charges, left Lodz for Warsaw in the hope that there they would be freer.[8] Only 108 were left in May 1940. Rumkowski and Dr. Szykier made many trips to Warsaw trying to induce doctors to come to Lodz, but few wanted to leave the supposed security of the metropolis for the closed Ghetto (the Warsaw Ghetto was not closed until November 1940). On 31 January 1941, Dr. Szykier

[5] Jasni, p. 214.
[6] *Ibid.*, pp. 285-287.
[7] *Ibid.*, p. 270.
[8] *Ibid.*, p. 175.

returned from Warsaw without any doctors—"None wanted to come to the Hell of Lodz."[9] In May 1941, he succeeded in bringing back 12 doctors. Others promised to come but on June 20th, Rumkowski had to go to Warsaw to plead with them to keep their promises to come by July first. It was rumored in Lodz that one of their own doctors had sent out a letter to the Warsaw doctors, advising his colleagues to stay where they were.[10] The Germans themselves partially solved the problem. Lodz became a transfer point for Jewish deportees from Germany, Yugoslavia, Belgium, Czechoslovakia, Roumania, and other occupied countries, on their way to the death camps. Among the deportees were physicians; Rumowski promptly recruited them. A bitter note enters here—for every doctor taken, an inhabitant of the Ghetto was substituted to keep the death quota constant. The Germans, however, kept taking doctors away for their own military hospitals:

> June 26, 1941. The German authorities today sent a letter to the Ghetto administration that within five days it was to send a list of those doctors, nurses, and sanitarians in the Ghetto. From now on they will be at the disposal of the German Army; therefore they will be in constant readiness to leave. When they need the Jew, he is clean, fine, honorable, and industrious, and all his faults are forgotten.[11]

The work of the physicians was not easy. Almost all were salaried officials of the administration; a very few were paid only for visits; still fewer were in private practice. In a conference on 18 April 1941, it was reported that from 1 May 1940 to that date, 71,102 home visits were made, the ambulance squad gave medical care at home to 94,355, and the emergency squad was called out 17,056 times. Many doctors worked day and night.[12] In his closing remarks at the conference, Dr. Szykier pleaded with the doctors not to falter in their fraternal responsibility, because they were saving their own people, bereft of help from any other source. Needless to say, the shortage of physicians resulted in many complaints. In a conference five months later, Chairman Rumkowski expressed his dissatisfaction with the disorganized way medical aid was given: long queues stood daily at the dispensaries and those at home had to wait days for the doctor to visit them. In the lively discussion that followed, the doctors described the hard-

9 Frank, p. 30.
10 *Ibid.*, p. 128.
11 *Ibid.*, p. 134.
12 *Ibid.*, p. 79.

ships under which they labored. The queues, they said, were not made up of patients but rather of those who came to get food coupons for themselves or relatives at home. The doctors did not object to giving out such coupons because food was as important as medicine, especially for the children, but the work was time-consuming. As for home visits, they could offer no solution—there were just too few doctors in the Ghetto.[13]

Nonetheless, the doctors attempted to maintain and extend their professional knowledge and skills by organizing a medical society, headed by Dr. Fabian Klausenberg. The titles of some of the lectures indicate the interests of the Lodz medical men: "Pellagra," "Avitaminoses," "Epidemic Diseases."

Three problems confronted the Health Division: hunger, tuberculosis, and infectious diseases. As for the first, little could be done. The Germans allotted, in line with their stated policy of getting rid of the Jews, 700 to 900 calories per day per person, far less than the minimum daily requirement. The Ghetto doctors protested that on such rations no one could last more than six to eight months.[14] Even this small allotment was cut down periodically and arbitrarily. For example, from 27 January to 2 February 1941, the Germans announced that no food would be sold to Jews.[15] Dr. Szykier noted that by the end of 1940 cases of hunger edema had already been seen.[16] Horse flesh was a luxury. Other unusual items of food appeared.

> May 20, 1941 . . . Today the police caught a certain David Mittleman who had for a long time been catching cats, killing and dressing them, and selling their meat as veal.
>
> May 22, 1941 . . . The terrible hunger raging in the Ghetto is unbearable. For the past two weeks there hasn't been the least food given out . . . No wonder suicides have increased again.[17]

Those who worked in factories or attended school got soup once daily. It was forbidden, however, to take out any food whatsoever from factory or school for those at home. A sample ration for June 1941 contained

> Bread: for workers: 2.25 kilos per week
> for unemployed: 1.14 kilos per week

[13] *Ibid.*, p. 173.
[14] Tabaksblat, Israel. *Hurbn Lodzh*. Buenos Aires, 1946, p. 61.
[15] *The Black Book*, New York, 1946, p. 225.
[16] Jasni, p. 362.
[17] Frank, pp. 103, 110.

Meat: for workers: 200 grams per week
for unemployed: 160 grams per week (and since there was no meat, two eggs were substituted).
Fats: 100 grams per week
Potatoes: 5.25 kilos per month
Sugar: 600 grams per month

To the Ghetto allotment was added, for all the patients in the hospitals, 1,000 eggs, 250 kilos of pudding powder, and 400 grams of marmalade per week. In actuality these were paper rations; the "norm" was never reached.[18]

The quality of the food was, to say the least, not good. For example, the Litzmannstadt police confiscated six barrels of spoiled sauerkraut from a German woman; these were later sold to the Ghetto. Of 1,517 kilos of meat sent at one time, 800 kilos were usable, 200 kilos had to be cooked immediately, and the remainder was so bad it was thrown out. The Ghetto was used by the thrifty Germans as a means of disposing of worthless provisions. In one instance, the "Eldest of the Jews" begged off from buying "at a bargain price" 20,000 dozen spoiled cans of oxtail soup.[19]

Hunger wiped out entire families. A young diarist writes:

August 23, 1941 . . . Mr. Kamusiewicz, . . . who was such an athlete before the war, today died of starvation. His iron constitution, which could fight off any illness, slowly deteriorated day by day and at last he fell asleep, never to be awakened. Alex (his son) also looks like a skeleton. . .[20]

No improvement, rather a worsening of the situation, took place. On 4 March 1942, Hans Biebow, the German official in charge of the economic exploitation of the Jews, complained that the Jewish workers could not maintain their productivity under such conditions. He said,

The health of the Jews sinks daily because the official rations exist only on paper, no food being allowed to come into the Ghetto. . . . The best proof of the nutritional status is the rapidly rising mortality rate. For example, from February 22 to February 26, 74 people died of pulmonary tuberculosis, 105 from heart failure, 84 from under-nutrition—better called starvation, and 44 from various causes all traceable to malnutrition.[21]

His complaints were disregarded.

July 5, 1942 . . . At home there is practically no food. Our entire stock is 'leaves' . . . A slow death begins.

18 Jasni, p. 419.
19 *Ibid*, p. 421.
20 Sierakowiak, David. *Dziennik*, Warsaw, 1960, p. 94.
21 *Dokumenty*, p. 243.

August 4, 1942 . . . Mrs. Kamusiewicz died. Just one day before death, the doctor said that she might have lived had she had only 3 dekagrams of sugar and 10 dekagrams of meat daily. In the Ghetto such treatment is impossible for 80% of the people. . .[22]

Against starvation the doctors were helpless. They gave out extra ration cards freely but the extra rations were insignificant. Starvation lowered the resistance of the people to disease and to the effects of cold. In the winter of 1942, "in every house the murderous cold increases . . . in every house the water is frozen. Almost every day there are victims of the frost. Today 19 men were found frozen to death in their beds."[23] The laity recognized the connection of hunger and infection: "Weakness brought on a cold, a cold brought on pneumonia, then followed a funeral. A scratch led to infection and death."[24] In several instances people hid the dead bodies of members of their families, not reporting their deaths in order to continue using the ration cards. Some packages were sent in by post from neutral countries during the early period of the Ghetto but later all such packages were confiscated "lest infectious diseases be transmitted from outside."[25]

With such widespread starvation, tuberculosis became epidemic. Lodz always had a large number of tuberculosis cases; the general public took for granted the necessity for periodic X-ray examinations. In May 1941, Dr. Ringelblum noted that "Lodz had 20,000 registered lung patients."[26] The number increased rapidly. When one in a family became ill, the others used their rations to feed him, themselves forgoing food, and thus increasing their own susceptibility to the disease. The doctors in the hospital decided on radical measures. The incurably ill, contrary to Jewish tradition, were not treated; they were "left to God's care." Those who had a chance to recover were treated as intensively as possible. The shortage of medications led to the use of folk remedies and whatever preparations could be smuggled into the Ghetto. Cod liver oil, popularly regarded as a tonic and a preventative of tuberculosis, sold for fantastic sums or was bartered for food. A 10 cc. vial of Vigantol cost a half-kilo of bread.

The result of the barter was that a sure thing was exchanged for a doubtful one and everywhere one bargained and deceived one's self to preserve one's health. Everyone wants to live—every sick man wants to get well.[27]

[22] Sierakowiak, pp. 149, 175.
[23] Frank, p. 255.
[24] Tabaksblat, p. 67.
[25] *Dokumenty*, p. 245.
[26] Ringelblum, Emanuel. *Notes from the Warsaw ghetto*, New York, p. 180.
[27] Tabaksblat, p. 75.

A new era is beginning in the spread of tuberculosis. Masses of people are feverish, spit blood, take a trip to the hospital and eventually to Marysin [the cemetery].

Today I feel depressed. Probably because of my sensitivity to what's happening to my school-mates with the most popular disease in the Ghetto, the so-called 'water on the lungs.' Rising temperature, aches and pains, sometimes coughing, sweats, X-ray—'shadows are visibly enlarged.' 'increase of apical densities,' injections, medicines, and finally the hospital and the cemetery.[28]

The doctors estimated that in 1943 over 60 per cent of the Ghetto population had active tuberculosis and 30 per cent were incurably ill from it.

Crowded quarters and lack of facilities for sewage disposal increased the toll of infectious disease. The Germans forbade the importation of coal or charcoal into the Ghetto; a bushel of coal secretly sold for a one-carat diamond; firewood was at a premium.[29] The first winter of the closed Ghetto saw the wholesale destruction of garbage wagons and refuse containers. The Ghetto administration laid severe penalties on anyone caught stealing or breaking up public receptacles, but future punishment was less tangible than present freezing. Finally, on 23 April 1941, the administration put up a large placard:

The rapidly increasing unsanitary conditions must be corrected as speedily as possible to prevent infectious diseases which can become epidemic under these circumstances. The garbage containers and night soil boxes which were broken up for firewood during the winter must be replaced. Dirty open privies must be covered up. . . . Violation is punishable by deportation from the Ghetto to forced labor [euphemism for death sentence].[30]

The administration provided push-carts for the collection of night soil; the manpower was readily available. Such collectors became administration employees and so had an assurance of steady rations. Intellectuals and former tradesmen, driven by their hunger, eagerly volunteered for the noisome task.

In July 1941 an epidemic of dysentery broke out.

A terrible epidemic is sweeping the Ghetto. It is called the 'Bloody Runs.' Hundreds fall ill every day. In every courtyard is heard shrieking and crying—Dear Father in Heaven, one plague after another! . . . For several days now the doctors are beside themselves, trying to halt the epidemic. Once a person gets sick with this, he is already in the hands

[28] Sierakowiak, pp. 145, 157.
[29] Jasni, p. 365.
[30] Frank, p. 81.
[31] *Ibid.*, p. 144.

of the Angel of Death. Doctors cannot help because they have nothing to work with.[31]

The German authorities, fearful that the epidemic would spread to the "Aryan side," ordered the doctors not to treat very sick Jews, but to let them die in strict isolation.[32]

Typhus fever spread in the winter of 1942. "The typhus epidemic is growing rapidly. A day doesn't pass that the emergency squad doesn't take several patients out of one house to the hospitals. 90% die in great misery; only a few recover. After a patient is removed from a room, the people in that room are under a 21 day quarantine. . ."[33]

The summer again brought dysentery and an increasing mortality. By now even trivial ailments were enough to cause death. "A seemingly healthy person lies down one day, can't get out of bed the next, and on the third is ready for Marysin, [the cemetery]. We do not say he had starvation disease, tuberculosis, or anything else. Just died."[34] The lack of medication and the short supply of food led to tragically ludicrous treatment: "For all sicknesses doctors are giving out coupons for yeast, which helps as much as cupping a corpse."[35]

The mortality rate rose sharply from the time the Ghetto was closed. In 1940 there were 6,851 deaths; in 1941, 11,437; in 1942, 18,020; in 1943, only 4,561, because 100,000 Jews had been removed for extermination at Chelmo.[36] Even these horrifying figures are less than the actual total. Hans Biebow indicated in a report to his superiors that the real number of deaths was much higher than the "Eldest of the Jews" announced because the latter did not want to decrease the provisions allotted to the Ghetto on the basis of population.[37] Notes from Frank's diary give a more vivid picture than statistical tables:

March 31, 1941 . . . This month the mortality by no means lessened. 55 births, 1023 deaths. From the cemetery control book—70% male, 30% female.

April 23, 1941 . . . The whole week the Angel of Death wandered about the Ghetto, wielding his sword right and left. He got the greatest number of victims from the hospitals. There were 100 dead, a few suicides, two accidents, and four shot to death.

[32] *Dokumenty*, p. 186.
[33] Frank, p. 277.
[34] Sierakowiak, p. 164.
[35] *Ibid.*, p. 170.
[36] Tabaksblat, p. 66.
[37] Jasni, p. 401.

April 30, 1941 . . . In the month of April which was supposed to be a mild one, we had nevertheless 804 deaths. . .

June 30, 1941 . . . In June, 75 births and 996 deaths. Hospital cases—500; suicides—81; killed by the German Ghetto guards—5; the remainder . . . died in their beds of hunger and consumption.

January 20, 1942 . . . The statistical office announced that 100 bodies were brought to the cemetery today. This is the first time that there have been so many in a single day.

May 11, 1942 . . . Today the cemetery workers had a hard day. 166 dead were brought in.[38]

The mortality figures exclude those deported to forced labor camps where they eventually died.

The Germans wanted the Lodz Ghetto to be economically useful to them. "Unproductive elements" were marked for destruction. The process of "clearing out" began in 1941.

June 24, 1941 . . . Today the Ghetto was investigated by a German medical commission. The most important part of the inspection was the examination of the Jewish hospital for the mentally ill; right then and there they ordered a great number of the patients to be shot. When the execution will take place is not known. . .

July 30, 1941 . . . The psychiatric hospital is on Wesola Street. . . Altogether there were 62 patients. All of a sudden an order came direct from Berlin that all insane Jews in the Litzmannstadt Ghetto were to be killed within 24 hours. . . . As their names were called, the nursing staff was forced to load them into the trucks. Two young women wept out loud, sobbed like little children, and went with bowed heads, like brides to the wedding canopy . . . a canopy of Death. One man, named Zisman, sang a hymn as he went to the truck. Another beat his breast saying 'Al-Chet' [a Hebrew litany, a recital of sins] . . . One woman couldn't wait, she ran instead of walking. She laughed constantly, crying out, 'Butter, butter, pfui on you, you bastards!' What she meant God alone knows. . . .[39]

Fourteen totally disabled patients from the Home for the Crippled were also shot that day.[40]

After this episode, the hospitals were not bothered for almost a year. Then came an order from the Gestapo that all incurably ill patients must be removed from the Ghetto. "The food that we Germans give is for healthy, industrious people, those who work for the Army. The sick are nothing but a burden for the Ghetto. They must be gotten rid of."[41] Two months later a group of

38 Frank, pp. 68, 83, 89, 255, 287.
39 *Ibid.*, pp. 134, 137.
40 Tabaksblat, p. 154.
41 Frank, p. 284.

German doctors came on a tour of inspection of the hospitals. They examined several patients and took photographs. "They were very polite to the Jewish doctors, whom they addressed as 'colleagues.' One of the Jewish doctors said later that this politeness is a fore-runner of a calamity—I hope he turns out to be a liar."[42]

The doctor was right. On 1 September 1942 all the hospitals in the Ghetto were liquidated. Early in the morning trucks drove up to each of them. S.S. men blocked the adjoining streets and ordered the directors to empty out the hospitals within ten minutes. The evacuation was brutal. Any patient who protested or even asked a question was shot on the spot, as were relatives who broke through the police lines, pleading to say a last farewell to their loved ones. In several cases, the Germans maliciously allowed parents to join their children, or vice versa, and then loaded them together on the trucks. Some patients succeeded in escaping in the confusion and fled to their homes; among these were 130 from the Mieckiewicz Street hospital. Within two hours, five hospitals were totally cleared out; 2,000 patients, including 400 children, were taken away.[43]

The tragedy did not end there. The Germans checked the hospital registers, decided that a large number of patients were missing and ordered them delivered up for deportation. Searches were made in the homes of their closest relatives; when the missing patients were not found, hostages were taken in their stead so that the quota would be completed.[44]

The Health Division was severely shaken by this blow and by the subsequent mass deportations which obviously made its services less necessary. The hospitals were converted into factories. Later two small hospitals and two dispensaries were reorganized but they were of little practical use.[45] They were merely way-points to the extermination centre at Chelmo. The killing of the Polish Jews proceeded systematically until in August 1944 only the Ghetto of Lodz remained, with 70,000 Jews. In that month, the "final solution" was achieved—all the Jews except a handful (700) kept for cleaning up were transported to destruction.

Grateful acknowledgment is given to Miss Dina Abramowicz of the YIVO-Jewish Institute for Scientific Research for her many suggestions.

[42] *Ibid.*, p. 319.
[43] *Ibid.*, p. 324; also Tabaksblat, p. 155, and Sierakowiak, pp. 191-192.
[44] Sierakowiak, p. 193.
[45] Hershkovitch, Bendet. *YIVO annual of Jewish social sciences*, New York, 1950, vol. V, p. 94.

REMOVING STONES

An engraving by Theodor de Bry (1528-1598). New Haven, Yale Medical Library, Clements C. Fry Collection.

In the sixteenth and seventeenth centuries a mentally unbalanced person was frequently believed to be carrying a stone in his head. Many an itinerant charlatan took advantage of this superstition by claiming to cure insanity through a superficial incision in the scalp and the pretended extraction of the stone or stones. The "stone cutting specialist," as he was generally known, was the target of numerous contemporary artists—Jerome Bosch, Jan Steen, Franz Hals, Jr., and others.

Theodor de Bry, a Flemish engraver, has depicted an enterprising quack hard at work. Clothed in an exotic costume with decorated turban and the "pilgrim's shell" of the itinerant around his neck, the sham practitioner is operating on the head of a rather rotund man who is strapped into his seat. While the next patient is being brought in most reluctantly by two assistants, the preceding victim is quietly nursing her wound in the background. Notice the removed stone on the nearby table.

Bry has adorned the charlatan's "office" with numerous articles. Hanging from the ceiling is a collection of stones from previous operations. Below these trophies are credentials with attached seals probably attesting to the quack's ability to cure. Surgical instruments, including a stylet, forceps, and scissors, and jars of unguent, are prominently arrayed on the table. Several medical books, as well as the owl, testify to a supposedly learned background. The Latin inscription under the engraving, an inscription which was often used by artists portraying such medical frauds, has been interpreted by Eugen Holländer to mean "it is not necessary to go to Anticyras, one can heal your sting here." (Anticyras was a doctor who freed Hercules from a nervous and debilitating sickness.[1])

The general mood of the engraving is one of gentle satire on the gullibility and ignorance of the people who provide an unending procession of ready victims. We might also consider, as Clements Fry has suggested, that such surgery to remove stones was the forerunner of lobotomy.[2]

D. J. K.

1 Holländer, Eugen. *Die Medizin in der klassischen Malerei*, 1903, pp. 216-217.

2 Fry, Clements C. "The sixteenth century cures for lunacy," *Amer. J. Psychiat.*, 1946. *103*, 351.

NIL OPVS ANTICYRAS ABEAS HIC TOLLITVR ÆSTRVM

Notes and Events

Edited by Dorothy M. Schullian*

Paré's Apophthegm

One of the most famous sayings in medical history is Ambroise Paré's "I dressed him, and God healed him." There are, of course, many other English renditions (e.g., "I dressed the wound and God healed it"), but these are a translator's prerogative. If, however, we consult standard medical history texts for Paré's own words we find several different versions:

Text	*Variant*
Ackerknecht, E. H. *A Short History of Medicine.* New York, Ronald Press Co., 1955, p. 101.	"Je le pansais, Dieu le guérit"
Baas, J. H. *Outlines of the History of Medicine and the Medical Profession.* Trans. by H. E. Handerson. New York, J. H. Vail & Co., 1889, p. 400.	"Je le pansay, Dieu le guarit"
Bailey, H. and Bishop, W. J. *Notable Names in Medicine and Surgery,* 3d ed., Springfield, Ill., Thomas, 1959, p. 100.	"Je l'ay pansay: Dieu l'a guerit"
Castiglioni, A. *A History of Medicine,* 2d ed. Trans. by E. B. Krumbhaar. New York, Knopf, 1947, p. 479.	"Je le pansay, Dieu le guarit"
Garrison, F. H. *An Introduction to the History of Medicine,* 4th ed., Philadelphia, Saunders, 1929, p. 225.	"Je le pansay, Dieu le guarit"
Guthrie, D. *A History of Medicine.* Philadelphia, J. B. Lippincott Co., 1946, p. 146.	"Je le pansait; Dieu le guarit"
Guthrie, D. *A History of Medicine,* rev. ed. with supplement, London, Nelson, 1958, p. 146.	"Je le pansay; Dieu le guarit"
Leonardo, R. A. *History of Surgery.* New York, Froben, 1943, p. 134.	"Je le pansay, Dieu le guarit"
Major, R. H. *Classic Descriptions of Disease,* 3d ed., Springfield, Ill., Thomas, 1955, p. 445.	"Je le pansay, Dieu le guarist"
Major, R. H. *A History of Medicine,* 2 vols., Springfield, Ill., Thomas, 1954, vol. 1, p. 429.	"que je pensay et Dieu la guarist"
Sigerist, H. E. *The Great Doctors.* Trans. by Eden and Cedar Paul. New York, Norton, 1933, p. 137.	"Je le pensai, Dieu le guarist"

* History of Science Collections, Cornell University Libraries, Ithaca, New York.

What did Paré say? The answer appears to depend on which edition of his writings one consults. The first appearance of his famous epigram is in his autobiographical *The Apologie and Treatise . . .* which was first published in the fourth edition (1585) of his *Oeuvres.* On page 1214 of this volume, in the section entitled *Le Voyage de Thurin,* the epigram first appears and is rendered "I[J]e le pensay, & Dieu le guarit" (see Fig. 1).

Le voyage de Thurin. 1536.

D'AVANTAGE ie veux icy monſtrer aux lecteurs les lieux & places où i'ay peu apprendre la Chirurgie, pour touſiours mieux inſtruire le ieune Chirurgien. Et premierement en l'an mil cinq cens trente ſix, le grand Roy François enuoya vne grande armee à Thurin, pour reprendre les villes & chaſteaux qu'auoit pris le Marquis du Guaſt, Lieutenant general de l'Empereur: où monſieur le Conneſtable, lors grand Maiſtre, eſtoit Lieutenant general de l'armee, & mõſieur de Mont-jan Collonnel general des gens de pied, duquel lors i'eſtois Chirurgien. Vne grande partie de l'armee arriuee au pas de Suze, trouuaſmes les ennemis qui tenoyent le paſſage, & auoyent faict certains forts & tranchees, de façon que pour les faire debuſquer & quitter la place, il conuint combattre, où il y eut pluſieurs tuez & bleſſez tãt d'vne part que d'autre: mais les ennemis furent contraints ſe retirer & gangner le chaſteau, qui fut en partie par le Capitaine le Rat, qui grimpa auec pluſieurs ſoldats de ſa compagnie ſur vne petite montagnette, là où ils tiroyent à plomb ſur les ennemis, il receut vn coup d'hacquebute à la cheuille du pied dextre, où tout ſubit tomba en terre: & alors dit, A ceſte heure le Rat eſt pris. Ie le penſay, & Dieu le guarit. Nous entraſmes à foulle en la ville, & paſſions par ſus les morts, & quelques-vns ne l'eſtans encore, les oyons crier ſous les pieds de nos cheuaux, qui me faiſoit grande paſſion en mon cœur. Et veritable-

Retraicte des ennemis.

FIG. 1. The first appearance (third last line) of Paré's apophthegm in the fourth edition (1585) of his *Oeuvres.*

The possible existence of textual variants of this epigram was checked by consulting copies of the 1585 edition of the *Oeuvres* from the following libraries:[1]

Birmingham Medical Institute
British Museum
Clendening Medical Library, University of Kansas Medical Center
Lane Medical Library, Stanford Medical Center
University of Michigan School of Medicine
New York Academy of Medicine
Royal Faculty of Physicians and Surgeons of Glasgow
Royal Society of Medicine
Yale University School of Medicine.

None of the nine copies from the above repositories differed in their rendition of the epigram, all giving "I[J]e le pensay, & Dieu la guarit."

[1] Information concerning these holdings was, of course, obtained from Janet Doe's invaluable *A bibliography of the works of Ambroise Paré,* Chicago, University of Chicago Press, 1937. Miss Doe, in accordance with information from Dr. Waller himself, credits the Waller Library with a copy, but the copy is not now in the Universitetsbiblioteket at Uppsala.

In later editions of the *Oeuvres* the situation is different, and Malgaigne has drawn attention to this in his edition of the *Oeuvres*. He states: "Dans presque toutes les premières éditions de Paré on lit *guerir, guerison;* dans les dernières, *guarir, guarison*. Bien que j'eusse raisonnablement le choix, je n'ai pas toujours voulu en user; et par exemple le mot célèbre de Paré: *Je le pansay, Dieu le guarit,* est incrusté sous cette forme dans toutes les mémoires; c'est ainsi qu'il a été originairement écrit; j'ai donc écrit moi-même, selon les occurrences, tantôt *gueri,* tantôt *guari.*"[2] In his own version of the *Oeuvres,* Malgaigne gives the famous epigram thus: "Ie le pensay, et Dieu le guarist" (vol. 3, p. 689).

Malgaigne's whimsical usage of now one and now another variant of Paré's apophthegm seems capricious, and I would suggest—if only to have our textbooks agreeing with one another and not, albeit unintentionally, misleading students—that we adopt from now on the wording as it first appears in the 1585 edition of the *Oeuvres,* namely "I[J]e le pensay, & Dieu le guarit."

L. R. C. Agnew

I am grateful to the librarians of the institutions mentioned in this paper for their kindness and courtesy in providing photocopies of the relevant passage in the 1585 edition of Paré's *Oeuvres.*

2 Malgaigne, J. F. *Oeuvres complètes d'Ambroise Paré,* Paris, Baillière, 1840-41, 3 vols.: vol. 1, p. cccxliii.

Hippocrates and Philosophy

The *De Medicina* of Celsus is an important source for ancient Greek medicine. One well-known passage in the Prooemium has resulted, I believe, in considerable confusion. Celsus wrote, "At first the science of healing was held to be part of philosophy, so that treatment of disease and contemplation of the nature of things began through the same authorities; clearly because healing was needed especially by those whose bodily strength had been weakened by restless thinking and night watching. Hence we find that many who professed philosophy became expert in medicine, the most celebrated being Pythagoras, Empedocles and Democritus. But it was, as some believe, a pupil of the last, Hippocrates of Cos, a man first and foremost worthy to be remembered, notable both for professional skill and for eloquence, who separated this branch of learning from the study of philosophy."[1]

There are three features of note here. First is the general statement, as if a matter of historical fact, that "medendi scientia sapientiae pars habebatur." This seems entirely reasonable, and is quite acceptable without cavil, that those who devoted their lives to the pursuit of wisdom should also have acquired a knowledge of medicine. The propriety of translating "sapientia" as "philosophy" may be questioned, for there are many post-renaissance overtones connected with this word, often of an unfavorable character, regarding the distinction between mere "speculation" on the one hand and "natural philosophy" or science on the other.

The second noteworthy feature of this passage is the reason alleged for the relationship between medicine and wisdom. It is suggested that too much thinking was bad for the health, that the thinkers, therefore, found it advisable to be their own physicians. That this is true, we may reasonably doubt. It might rather be one of those statements which reveal more about the historian than about history.

The third important feature is the remark that Hippocrates, "vir et arte et facundia insignis," was the first who ". . . a studio sapientiae disciplinam hanc [i.e., medicine] separavit." Again it is very questionable whether "philosophy" is the best translation for "sapientia." That Hippocrates was opposed to much of the speculation of his era is, of course, clearly established in "genuine" writings, and in the area of unbridled speculation the word "philosophy" might well have an unfavorable connotation. But Hippocrates had his own philosophy of nature and philosophy of science, and in this context "philosophy" should not have a pejorative sense.

Just what Celsus intended to convey by this widely quoted statement has not been very clear. It might be of interest, therefore, to note a relevant passage in Boerhaave, which throws some oblique light on the subject. Boerhaave began the *Praelectiones academicae*[2] with a sketch of medical history. When he discussed Hippocrates he said, among other things, "Et quando philosophiam ad medicinam nihil facere adseruit, de philosophia dixit morali, in qua sola tunc versabatur Schola Pythagorica."[3] This may be translated, "And when he declared that philosophy had nothing to do with medicine, he referred to moral philosophy, to which alone, at that time, the school of Pythagoras was devoting itself." There is no explicit mention of Celsus' statement, but the reference seems quite implicit.

Boerhaave thus suggests that Hippocrates separated medicine only from ethical theory, not from metaphysics or knowledge of first principles. And not from all ethics, for the Hippocratic oath precludes any exclusion of ethical philosophy as a whole. But it is, perhaps, suggested that only the bizarre Pythagorean doctrines were to be excluded while more conventional ethical questions might still come within the confines of medicine. Since Celsus' original statement is rather obscure, it seems worthwhile calling attention to all references which bear on the subject—even though they add new problems for interpretation. Can any readers throw more light on this problem?

LESTER S. KING

REFERENCES

1. Celsus, *De Medicina*, with an English translation by W. G. Spencer. London, William Heinemann, Ltd.; Cambridge, Massachusetts, Harvard University Press, reprinted 1948-1953, 3 vols.: vol. I, pp. 4-5.
2. Hermann Boerhaave, *Praelectiones academicae*, Albertus Haller, Ed. Taurini, Typographia Regia, 1742-1745, 5 vols.
3. *Op. cit.*, I, 20 (§13, note).

Ruben Eriksson, 1895-1962

The Journal records with sorrow the death, on 20 September 1962, of the outstanding scholar-librarian Ruben Eriksson, who until his retirement in 1961 had been Head Librarian of the Karolinska Institutets Bibliotek in Stockholm, Sweden.

Active in medico-historical activities in his own country, Dr. Eriksson followed with interest the current work here and had close relations with the Journal. His note entitled "Vesaliana" was published in the Journal (1958, *13*, 526-527) and his contributions elsewhere were frequently cited here. The crowning work was his splendid edition, with introduction, translation into English, and notes, of Baldasar Heseler, *Andreas Vesalius' First Public Anatomy at Bologna, 1540, an Eyewitness Report, together with his notes on Matthaeus Curtius' Lectures on Anatomia Mundini.* Published at Uppsala and Stockholm in 1959 after many years of careful preparation, it took its place at once as a solid addition to our knowledge of Vesalius. The reviews were enthusiastic. Dr. Eriksson continued the modest and scrupulous scholar. He had laid plans for research work in retirement which are now cut short, including a note for the Journal on manuscripts likely to have been in Heseler's possession.

National Institutes of Health

Inquiries regarding grant assistance from the National Institutes of Health in the field of history of medicine and allied health sciences should now be made to Dr. James H. Cassedy, Executive Secretary of the History of Medicine Study Section, Division of Research Grants, NIH, Bethesda 14, Maryland. Dr. Cassedy replaces Dr. Jeanne L. Brand, who is now primarily concerned with the foreign grant program of the National Institute of Mental Health but also retains an administrative interest in grants in the history of psychiatry. She is Grants Program Specialist, Research Grants and Fellowships Branch, NIMH, Bethesda.

Historical Gleanings

Urban T. Holmes, Jr. and Frederick R. Weedon discuss in *Speculum*, 1962, *37*, 252-256 the competence of Peter of Blois as a physician. The authors term his Letter 43, dating from about 1170-1175 and written to his friend Peter *medicus*, "a milestone in the history of medicine . . . the earliest example known to the present writers of the case history method being used in medical communication. It is commonly believed that this practice began in the twentieth century." The case was one of "medium ague."

In *The English Historical Review*, 1962, *77*, 304-306, Dennis E. Rhodes suggests that "Aregentinus medicus," mentioned in Domenico Mancini's Latin chronicle of Richard III's seizure of the throne, was not, as interpreted

by C. A. J. Armstrong (1936), "a Strasbourg doctor," but rather John Argentine, provost of King's College, Cambridge, from 1501 until his death. He had studied theology and medicine and is the author of a work on diseases and their remedies which is preserved in manuscript in the Bodleian Library. It is "quite feasible that he had already in 1483 been appointed physician to the two sons of King Edward IV." An article by Mr. Rhodes entitled "Provost Argentine of King's and his Books" appeared in the *Transactions of the Cambridge Bibliographical Society,* 1956, *2,* 205-212.

In *Mélanges d'histoire du livre et des bibliothèques offerts à Monsieur Frantz Calot* (Paris, 1960), pages 91-97, André Hahn, Paule Dumaitre, and Janine Samion-Contet examine the title page and plates of the 1543 edition of Vesalius's *Fabrica.*

Physis continues to publish articles which are of great interest to medical historians. The first fascicle for 1962, for example, included on pages 39-64 "Early Concepts of the Anthropomorphia," by Charles D. O'Malley and Horace W. Magoun, and on pages 65-73 "Micrografia illusoria e 'animalcula,'" by Luigi Belloni.

In *Proceedings of the Huguenot Society of London* for 1959-1960, *20,* 177-194, Margaret E. Rowbottom explores the Huguenot friends and acquaintances of Robert Boyle.

In "A Store Mixt, Various, Universal" (*The Journal of the Rutgers University Library,* 1961, *25,* 1-9) David L. Cowen discusses a broadside of 1784 in which Smith, Moore & Co. of New York advertised for sale a collection of materia medica and related items. The broadside is in verse, and the "eighteenth-century copywriter managed to knead no fewer than 120 names, most of them exotic, into his poetics."

Rheinische Lebensbilder, 1961, *1,* 152-167 contains an article by Johannes Steudel on "Johannes Müller (1801-1858)." Dr. Steudel has contributed also to *Grünenthal-Waage,* 1961, *2,* 2-12 a richly illustrated discussion, "Abscheid vom Wickelkind," of swaddling clothes.

The annual *Strenna storica bolognese* often includes articles of interest to medical historians. In the issue for 1961 (Anno Undicesimo), for example, appear Aldo Andreoli's "Ulisse Aldrovandi e Gregorio XIII (e la teriaca)", pp. 11-19, and Luigi Federzoni's "Chirurgia contro medicina," pp. 219-224, which concerns the political activities of Giuseppe Ruggi and Augusto Murri. This issue provides at the end, pp. 527-539, a useful index by authors and subjects of the first ten volumes of the publication.

An article by Daniel M. Madden in *The New York Times* of 13 May 1962 calls attention to the reviving fashion of "taking the waters" at famous

European spas. These number more than five hundred and include Belgium's Spa, France's Vittel and Vichy and Aix-les-Bains, Switzerland's Schinznach-Bad, West Germany's Bad Nauheim, Austria's Bad Gastein, Italy's Montecatini and Fiuggi, and Greece's Loutraki and Kaiafi. Will a revival in the health resorts of this country follow?

A colloquium on "Science in the Renaissance (XVth-XVIIth century)" was held in Florence 22-23 June 1962 under the joint sponsorship of the Harvard University Center for Italian Renaissance Culture, the Museo di Storia della Scienza of Florence, and the Gruppo Italiano do Storia della Scienza. At the close of the sessions, one year after his death on 24 June 1961, Andrea Corsini was commemorated in addresses by Adalberto Pazzini and Luigi Belloni.

It is a pleasure to announce that the Neuburger chair in the history of medicine has been re-established at Vienna and that effective 1 October 1962 Professor Erna Lesky was appointed to it.

The Eleventh Annual Meeting of the American Academy of the History of Dentistry was held 26 October 1962 at the Eden Roc Hotel in Miami Beach, Florida. In the words of the president, James Milton Courtney, "the profession at large is taking a serious look and beginning to realize that the history of our own profession is a most important facet to the professional life."

The Fourth Victor Robinson Lecture was delivered at the Temple University School of Medicine on 31 October 1962 by Howard C. Rice, Jr., of the Princeton University Library. The subject was "Albert Schweitzer: Some Bibliographical Digressions." Princeton has an extensive collection of items by and about Schweitzer. The lecture will be published in the *Temple University Medical Center Bulletin.*

The History of Science and Medicine Society of the Washington University School of Medicine has been active throughout the academic year. The last meeting of the year will be held on 11 April 1963. Details may be obtained from Dr. Estelle Brodman, Librarian and Associate Professor of Medical History, Washington University School of Medicine, 4580 Scott Avenue, St. Louis 10, Missouri.

In December 1962 the library staff of the University of California Health Center, under the direction of Provost J. B. deC. M. Saunders, arranged an exhibition of herbals from the Center's historical collections. An exhibition on the development of Russian physiology was also mounted to illustrate a series of seminar discussions on the subject offered by Chauncey D. Leake. Brenda Crudge, formerly of the Library of the College of Physicians and Surgeons of Columbia University, has accepted appointment as Librarian of the Historical Collections.

Applications are again invited for The Logan Clendening Travelling Fellowship in the History of Medicine. The Fellowship is of the value of $1,000 and is tenable for three months during the summer of 1963. Details and the special form required may be obtained from L. R. C. Agnew, Chairman, Department of the History of Medicine, The University of Kansas Medical Center, Kansas City 3, Kansas. The form should be returned not later than 15 March.

On 8-9 December 1962 the University of Ferrara celebrated the fifth centenary of the birth of Giovanni Manardo (1462-1536).

The Henry Schuman Medical History Prize

The Henry Schuman Prize of $250 is offered annually by Mrs. Schuman for an original essay in the history of medicine or its allied sciences. The competition is open to those in any country who have received a qualification in medicine (M.D., M.B., L.R.C.P., etc.) or a Ph.D. within five years of the date of submission of the essay. The year of the degree should be indicated in the letter of transmission.

The "history of medicine" may be broadly interpreted: papers might trace the evolution of concepts, or deal with the history of the ideas and accomplishments of particular scientists, or might present a study of the influence of different branches of medicine on one another or on other fields of scientific endeavor. The growth of medicine might also be considered in relation to its effect on social and economic progress, philosophy and religion, or art and literature.

Essays should be approximately 5,000 words in length, exclusive of footnotes, and should be adequately documented. They must be written in English and typed double space (including the footnotes). Papers should be sent to Dr. Thomas R. Forbes, Editor of the *Journal of the History of Medicine and Allied Sciences,* 333 Cedar Street, New Haven 11, Connecticut, U.S.A., and must be received on or before 1 July 1963 for the 1963 prize. Essays entered simultaneously in any other competition are not eligible for consideration.

It is hoped that the prize-winning essay will be suitable for publication in the *Journal of the History of Medicine.* The judges reserve the right to withhold the prize in any year if no essay is deemed of sufficient merit.

Book Reviews

FRANCISCO GUERRA. *American Medical Bibliography 1639-1783*. New York, Lathrop C. Harper, Inc., 1962. 885 pp. $45.00.

Reviewed by BROOKE HINDLE, *Professor of History, New York University.*

THIS annotated bibliography provides a remarkably comprehensive survey of American medical publication through the War of Independence. Of the three major elements, two, books and almanacs, are presented in chronological order, while the medical content of periodical publications is noted in alphabetical lists of the serials. A variety of indexes, alternative listings, and additional categories significantly extend the value of the work. Since the Bibliography will serve scholars, bibliographers, and collectors both as a guide and as an historical source, these two aspects should be separately considered.

As a guide, the scope and accuracy of the work are its most impressive characteristics. Dr. Guerra has been especially successful in extending the number of medical books, pamphlets, and broadsides published in this period far beyond the collections of titles compiled by previous students. He did not accomplish this by broadening the definition of the medical sciences for he has excluded even botany and related studies except where medical relevance was specifically asserted. He has, however, included whole new categories of material, notably governmental publications which constitute about a third of this section. Even so, he has limited himself largely to published provincial laws or proclamations; he includes the *Journals of the Continental Congress* but not the legislative journals of the separate colonies or states. The survey of magazines and newspapers represents an especially laborious duty and a very valuable one: Dr. Guerra has identified the specifically medical items by title or brief description. In giving similar attention to the medical contents of almanacs, Dr. Guerra calls attention to another neglected category of medical publication.

As an historical source, the Bibliography must be used with care for errors of interpretation are to be found and ought to be examined. Most important is the handling of the almanacs which have been accorded such unusual attention and to which Dr. Guerra has provided so fine a guide. He finds that 506 of the 1,685 almanacs he identified contained medical material, the character of which he here indicates. The trouble follows from attempting to be more precise in identifying pseudonyms and in determining authorship than the known facts warrant. When the title page refers to Ames or Tulley as the author, it is reasonable to ascribe the medical material included to them. It is reasonable, too, to identify the

Richard Saunders of the early *Poor Richards* with Franklin and to consider Franklin responsible for the medical contents. However, Saunders was not precisely a pseudonym and Franklin certainly was not the author of the later *Poor Richards.* Abraham Weatherwise, Andrew Aguecheek, and Copernicus are not pseudonyms to be identified but parts of the title.

Ordinarily the printer appears to have put the almanac together and to have hired someone to calculate the astronomical data he needed. Particular error follows when his "calculator" is regarded as the compiler or author of the entire almanac, including its medical contents, for often he clearly was not. David Rittenhouse, specifically, contributed the astronomical calculations for several almanacs but it is highly doubtful that he had anything to do with the medical content of any of them. This relationship is clearly spelled out in Humphreys' *Universal Almanack for . . . 1775* where the title page says only "D. Rittenhouse, A.M. has again favored us with the Calculations." But Dr. Guerra lost this phrase and has substituted, "[By] D. Rittenhouse A.M."

Several generalizations need amendment. The suggestion that the rise of Philadelphia as a center of medical publication was primarily a question of German items is best contradicted by this *Bibliography.* The assumption that John Morgan was the victim in the wartime medical controversy is at best an oversimplification. The significance of astrological medicine is at least a question.

As a guide, Dr. Guerra's *Bibliography* will become an enormously valuable instrument. As a historical source, it has almost equal potential but must be used with greater discrimination.

EDUARD FARBER, Ed. *Great Chemists.* New York, Interscience Publishers, 1961. xxvi, 1,642 pp., illus. $29.50.

Reviewed by GEORGE M. FLECK, *Assistant Professor, Department of Chemistry, Smith College, Northampton, Massachusetts.*

THIS large volume of biography opens with a discussion of the work of two Mesopotamian women, perhaps the earliest mentioned chemists in history, who prepared perfumes 3,000 years ago. It continues into the twentieth century, but no chemist now living has been included.

The typical biographical sketch is about 5,000 words in length and is accompanied by a full-page portrait. Mr. Farber has written six of the biographies, translated others, and provided some enjoyable intervening commentary. Several biographies were prepared by other authors especially for this collection. A number were written many years ago by colleagues, students, and contemporaries of the subjects and have been translated and condensed when necessary.

No attempt has been made to achieve uniformity of treatment; with 94 biographers writing more than 115 biographies, uniformity is undesirable and probably unattainable. The happy result is that each chemist has been

considered as a separate individual, and tendencies toward excessive generalization and comparison of personalities have been minimized.

Most of the memoirs were written by scientists. The biographies of Gay-Lussac by Arago and of Nernst by Einstein are but two sketches having special interest because of the men who wrote them. Mr. Farber has provided valuable short paragraphs about each of the contributors.

Greatness in chemistry manifests itself in many ways, and this book provides case histories both of greatness revealed in the contributions of the ascetic laboratory experimenter and of greatness documented by the contributions of many outstanding students of a single teacher. Organic, inorganic, and physical chemists of the past century are well represented, and industrial chemists have been included with those from the universities.

It is in the nature of the short biographical essay that it often stimulates further inquiry about the life and works of the man, and the reader deserves a well-written bibliographical note as at least a preliminary guide to the relevant literature. Mr. Partington's 171 references in the chapter on van Helmont are surely adequate, and many of the authors have supplied useful suggestions for further reading. It is unfortunate, however, that in a substantial number of cases either no bibliography is given or the few footnotes which do appear are not very useful as a means of access to additional material by and about the chemist.

Mr. Farber is to be commended for bringing together in English a great deal of interesting material on the makers of chemistry and for writing interesting and authoritative biography. His collaborators are also to be congratulated for setting a high level of scholarship in their contributions.

In addition to being a valuable contribution to the scholar's library, this book can provide many hours of good leisure reading for the non-specialist. It is hoped that in spite of the high price it will find its way onto the shelves of school libraries and into the general reading collections of college and university libraries.

PIERRE HUARD and MIRKO DRAZEN GRMEK, Eds. *Leonardo da Vinci. Dessins Scientifiques et Techniques.* Paris, Roger Dacosta, 1962.

Reviewed by KENNETH D. KEELE, *Consultant Physician, Ashford and Staines Hospitals, Middlesex, England.*

To make a selection of Leonardo da Vinci's drawings representative of his approach to any aspect of science is a hazardous procedure. In this adventure with regard to Leonardo's scientific drawings two professors of medicine, Pierre Huard and Mirko Drazen Grmek, have here been successful.

Books containing selections of Leonardo's drawings are common; often they attract by the perennial charm of his style and subject; too often they ignore the intellectual content with which so many of his drawings are saturated. It was a fact that on hundreds of pages drawings constituted Leonard's intellectual catharsis—his method of communicating to

himself and posterity what was incommunicable to those around him. Particularly in a selection of the scientific drawings, therefore, one looks for much intelligible communication—and here one finds it.

One appreciates the skill with which Professors Huard and Grmek have succeeded in finding eighty, out of hundreds of such drawings, which merit the term "representative." This depends on their realization that Leonardo's uniquely sensitive mind made its perceptions purely as visualizations. Thus he came to attach prime importance to the act of making objects and patterns of nature visual in the form of drawings and paintings, which at times constituted the symbols of his deepest ideas.

His science was built up from the observation of nature, from the representation of things themselves to the representation of the schemes of things, as when his sketches of plants work up to reveal the patterns of phyllotaxis. Like the Chinese, with whom he had so many harmonious tints of mind, he saw events around him, both organic and inorganic, as linked by pattern rather than cause and effect.

The authors have arranged the drawings by subject, grouping them under the headings, mechanics, optics, etc. They are blended with the introductory text in such a way as to circumvent one's consciousness of the abridgement which is inevitable. To appreciate the drawings it is essential to read first the four introductory chapters which are masterpieces of condensation, and which interlink in lively detail with the plates subsequently shown. Apart from this, in themselves, these chapters make stimulating reading. Their penetrating comment on Leonardo's activities draws on a wide knowledge of the history of science and ideas; this surrounds Leonardo's work with an enriching context, which is ever becoming more distinct as the intellectual activities of medieval workers come into clearer view. It is no disparagement of Leonardo to find that many of his drawings, particularly those of industrial and military techniques, were derived from predecessors in Germany and Italy. It serves only to present him in yet another aspect of his role as a giant bestriding the gap between ancient and modern thought. It is not sufficiently realized that Leonardo studied and preserved a great deal of ancient work, fertilizing it for posterity with the germinating interest of his mind and the skill of his hand.

Leonardo's scientific approach is well demonstrated by his emphasis on the importance of mathematics. He who knew no algebra, who could not even write an equation, could not possibly demonstrate the place of mathematics in science as Galileo did—but he loved his mathematics with an intuitive appreciation. Instead of formulae Leonardo had to use the ancient Greek method of analogy for finding laws. This method he used with intuitive insight, as for example where he saw an analogy between the movement of oil in a wick and the sap in the plants, an inspired analogy which, incidentally, ruined his chance of discovering the relation of the force of the heart-beat to the circulation of blood. And though its ultimate physical and chemical truth is evident to us now, his favorite analogy

between the processes of the macrocosm and the microcosm, was at his stage of knowledge an erroneous snare.

The presentation of Leonardo's drawings is less happy than the introductory text. Here one becomes more aware of incompleteness and fragmentation. In the first place the authors show an example of the synthesis of Leonardo's many-facetted genius; it is the same page from the Windsor manuscripts as that selected by Heydenreich for this purpose. However, presented bare of comment, too great a burden is laid on the reader to comprehend its rich significance, for it requires a verbal amplification which it does not receive. Similar difficulty arises in the appreciation of a number of the plates, for example that on the mechanics of liquids and solids (No. 6) and that on the study of the radiation of light (No. 9). The drawings on optics on Plate 12, without some explanation, surely make quite unintelligible physics to one unversed in Leonardo's views of the anatomy of the eye. On the other hand, the comment on the drawing showing the impact of light on the human face makes an extremely satisfying enrichment of the study.

Transcription and translation of some of Leonardo's own explanatory notes would have greatly added to the value of many of these drawings. Their intellectual content is immense; and one must face the fact that it is quite impossible even to glimpse the significance of a composite drawing like that on the flight of birds (Plate 31) without explanation; nor does it do justice to Leonardo to present them so fragmentarily and nakedly.

This absence of comment is unfortunate; indeed on first inspection one has the impression that this is just another collection of Leonardo's drawings served up for the purpose of idle browsing. And this is not true; there is far more depth to the book, a depth unfortunately concealed, even at times lost, by lack of a guidance which the authors in the introductory chapters show themselves so well qualified to give. Moreover, there can be no doubt of the sensitive interpretations of Leonardo's work to be found in this volume which is beautifully reproduced. The weakness of guidance to the reader should not be allowed to conceal the fact that it provides, both aesthetically and scientifically, a real stimulus to appreciation of Leonardo's work and methods.

G. E. W. Wolstenholme and Cecilia M. O'Connor, Editors. *Medical Biology and Etruscan Origins.* Boston, Little, Brown and Co., 1959. xii, 255 pp. $9.50.

Reviewed by Jerry Stannard, *Research Associate, Department of History of Science and Medicine, Yale University.*

One of the major unsolved problems of historical scholarship is the ethnic origin of the Etruscans. It was in order to help solve this that the present symposium was convened in London, 23-25 April 1958. Although no

positive conclusions were accepted unanimously, the participants were agreed that some new methods should be examined.

The biologists claimed that the skeletal remains of extinct populations provide information independent of that obtained by classical archaeology and glottology. The preparation of blood-group distribution maps appeared to be a promising technique because certain transmissible and genetically identifiable characters, e.g. thalassaemia, may help to differentiate the Etruscan from contemporary but non-Etruscan races.

The osteometrical and blood-group surveys were, however, open to some criticism. It was argued that an insufficient sample of proven Etruscan skeletons prevents any definite conclusions while blood-grouping may lead to anomalous results. The difficulties involved in attempting to graft the medical-biological method to that of the classicist were summed up by R. Ceppellini who noted that one is dealing with "two different kinds of inheritance, biological and cultural" (p. 202).

In addition to the tables and maps, the volume contains photographs of Etruscan artifacts and two appendices (pp. 246-49) on methods of preserving bones for serological examination.

L. SCHELER and W. A. SMEATON, Eds. *Lavoisier et la Révolution française.* Vol. II. *Le Journal de Fougeroux de Bondaroy.* Paris, Hermann, 1960. 222 pp.

Reviewed by RHODA RAPPAPORT, *Instructor, Department of History, Vassar College, Poughkeepsie, New York.*

THE modest volume entitled *Le Journal de Fougeroux de Bondaroy* is the second in a series devoted to relatively little known aspects of Lavoisier's activities during the early years of the great Revolution. Volume I, concerned with the Lycée des Arts, appeared in 1957. Volume II, like its predecessor, is a contribution to Lavoisier studies, but is also an important account of a limited period in French history written by an observer and participant.

Fougeroux de Bondaroy (1732-1789), described by the editors as "botanist, agronomist, geologist and archaeologist," was one of Lavoisier's colleagues at the Academy of Sciences and a leading citizen in the district of Saint Louis de la Culture, the area of Paris extending south from the present Place de la Bastille to the Seine and west to the Pont Marie. As a member of the permanent Committee of his district, Fougeroux was in an ideal position to observe the workings of one of the most important of the sixty local committees which had assumed control of the day-to-day government of the city.[1] His journal, which covers the weeks of 12 July-29 August 1789, therefore offers both a reliable supplement to the available volumes of official documents and several new details carefully indicated by the

[1] When Paris was re-organized administratively in 1790 and the 60 districts replaced by 48 *sections*, Saint Louis de la Culture became the major part of the Section de l'Arsenal.

editors. The journal's minor inaccuracies, omissions, and obscurities, attributed by the editors to Fougeroux's mounting cerebral disorders resulting in a fatal apoplectic stroke in December, probably stem also from his having written many of the entries several days after the events had occurred (pp. 49, 129). Nonetheless, especially in view of the destruction in 1871 of the records of most of these committees, Fougeroux's journal is of considerable value in enriching our knowledge of the swiftly moving events of the hectic summer of 1789.

Of particular importance to the historian of science are the details Fougeroux supplies about Lavoisier's activities as a resident of this district. Elected to the permanent Committee on 24 July, Lavoisier concerned himself with matters of scientific interest as well as with others of a more purely political nature. He thus became (as did Fougeroux) a member of the Bureau de la Bastille, which was charged with investigating ways and means of demolishing the old fortress. The problem, which devolved upon Saint Louis de la Culture as the district in which the Bastille was situated, was one of razing the structure while avoiding damage to neighboring buildings and the sewage system, preserving the stones for future use, and providing a maximum of entertainment for the Paris mobs (pp. 76-86, 136).

Fougeroux also gives an account of the famous incident of the boatload of gunpowder, an incident in which Lavoisier, as one of the *régisseurs des poudres,* was a central figure (pp. 120-129, 136-137, 137n.1). Here the author's remarks leave little doubt that an earlier date must now be assigned to Lavoisier's justificatory piece, the "Memoire de la Régie des poudres." The memoir, or most of it, was apparently written immediately after the event—rather than two years later, as Smeaton himself had once suggested—but Lavoisier was dissuaded from publishing it at that time. (An official account, to which Lavoisier contributed, did appear in 1789.) Its eventual publication in 1791 may have been provoked by the attack on Lavoisier in Marat's *L'Ami du peuple.*[2]

A contemporary account of these two dramatic incidents in Lavoisier's career—and others are also recorded (pp. 16-17)—would, in itself, assure Fougeroux's journal a permanent place in the literature of the history of science. But the general historian, too, is indebted to Scheler and Smeaton for making available a lively and primarily first-hand report of an early phase of the French Revolution. The volume is scrupulously annotated, and the editors have included in their Preface a biographical sketch of the author as well as an evaluation of the significance of the journal. (They do not, be it said, reveal the location of the two manuscripts of the journal; one assumes that these are, or were, in the possession of M. Scheler.) The Appendix of related documents, bibliography, index of names, and map of Saint Louis de la Culture all add immeasurably to the volume's usefulness.

2 W. A. Smeaton, "Lavoisier's membership of the Assembly of representatives of the Commune of Paris ,1789-1790," *Ann. Sci.,* 1957, *13,* 235-248, p. 238 n.7. Cf. Denis I. Duveen and Herbert S. Klickstein, *A bibliography of the works of Antoine Laurent Lavoisier 1743-1794,* London, 1954, pp. 328-330 and 296-297.

J. L. W. THUDICHUM. *A Treatise on the Chemical Constitution of the Brain [1884], with a new historical introduction by David L. Drabkin.* Hamden, Conn., Archon Books, 1962. xlii + [xxiii + 262] pp. $15.00.

Reviewed by EDWIN CLARKE, *Visiting Associate Professor of the History of Medicine, Yale University School of Medicine.*

THE story of Thudichum is now well known since the publication of Dr. Drabkin's extensive, albeit somewhat biassed, account of his life and writings. One of his classical contributions to the science of biochemistry is the *Treatise* which appeared in 1884 and the present book is a facsimile of this edition. This work is the foundation stone of chemical neurology and in recent years has become exceedingly rare.

The editor's introduction, though dealing with a complex topic, seems rather muddled, and the typography and method of referencing do not help either. A glossary of chemical terms enables the reader to follow Thudichum's nomenclature which differs from that of today in certain important areas.

In 1901, an expanded German edition of the *Treatise* appeared, and the present volume could have been improved by the inclusion of some of this supplementary material, in translation. For example, its critical history of chemical neurology would have been very valuable.

The editor concludes by suggesting that the *Treatise* "should be read by every biologist." It certainly should be available to them as it now is, although the price seems excessive for a reprint. However, the technical complexities of the subject will limit detailed consideration of the book to biochemists, particularly the neurochemist.

JOHN Q. ANDERSON. *Louisiana Swamp Doctor: The Life and Writings of Henry Clay Lewis.* Baton Rouge, Louisiana, Louisiana State University Press, 1962. viii, 296 pp. 8 figs. $5.00.

Reviewed by WARNER WELLS, *Associate Professor of Surgery, University of North Carolina, Chapel Hill, North Carolina.*

HENRY CLAY LEWIS, aged 27 years, had practised medicine for four years in the small rural community of Richmond, Madison Parish, Louisiana, when his career was abruptly terminated by death from drowning on 5 August 1850. "He had been on a professional visit in the Swamp, and on returning home and not finding a boat in readiness to set him over, he attempted to swim his horse across the bayou and was drowned before assistance could be extended."

This young doctor came to be remembered more for his ability and promise as a writer than as a physician, his claim to literary memory being invested in a series of humorous sketches published variously from his days as a medical student in July 1845 until his untimely death five years later. His first sketch, destined to become his most widely published tale, was

entitled "Cupping on the Sternum" and appeared in the New York weekly, *Spirit of the Times.* In March 1850 A. Hart of Philadelphia published the complete collection of Dr. Lewis's stories under the title: *Odd Leaves from the Life of a Louisiana Swamp Doctor.*

A delightful biographical study, together with a carefully annotated collection of all of Lewis' known works, including several that appeared only in *Spirit of the Times,* is given to us by John Q. Anderson, professor of English at Texas Agricultural and Mechanical College. In a note about Professor Anderson's work it is stated that, except for identification of authorship through one of Lewis' descendents, almost nothing was known about him.

"When I set out to solve the mystery of the *Louisiana Swamp Doctor,*" writes Professor Anderson, "I never imagined that I was on the trail of a lusty young man rather than an elderly physician, so deceptive was the pose that 'Tensas' maintained in his sketches." (Henry C. Lewis' pen name was "Madison Tensas"—from Madison and Tensas Parishes and the Tensas river in northern Louisiana.)

When interest in the American frontier intensified in the twentieth century, Lewis' work was rediscovered by students of frontier humor writing of the Old Southwest. A few of his sketches were reprinted among the best examples of what Bernard De Voto labeled the "Big Bear School" of American writing. In his pioneer work in the field, Franklin J. Meine included Lewis' "Cupping on the Sternum" in *Tall Tales of the Southwest* (1930). In 1936, Arthur Palmer Hudson used Lewis as an example in his *Humor of the Old Deep South,* and Walter Blair placed "Tensas" among the ten best authors of Southwestern humor in his *Native American Humor* (1937).

By comparing the author's biography of Lewis with the collected sketches it is obvious that the latter are distinctly autobiographical. Their humorous nature made them popular in his own day, and even more so today because he so faithfully depicted the apprenticeship, training, and practice of medical doctors of his period. Not only do we get a vivid picture of pioneering America, but a lively description of the proprietary medical school of that day. Though not certainly documented, it is likely that Lewis attended Dr. Drake's school in Louisville. When the great *Diseases of the Interior Valley of North America* was published in 1850, Lewis purchased a copy. In Rudolph Matas's *History of Medicine in Louisiana,* Lewis is quoted for his account of the daily life and practice of a rugged, hard-working country doctor, and uses as example the amputation scene from "The Indefatigable Bear Hunter."[1]

In form, Lewis was a realist, employing the most useful devices of Southwestern humor, the framework story, dialect, folklore, and the mock oral tale. The habits, methods of study, diversions, and pranks of medical students

[1] Matas, Rudolph. *History of medicine in Louisiana.* John Duffy, Ed. Baton Rouge, Louisiana State University Press, 1962, vol. II, pp. 56-57.

are described in robust prose. The careful, incisive build-up in lean, spare prose to crises or dénouement suggests the literary forebear of Mark Twain in his river stories. There is the contrast of rude, indelicate horseplay and corny puns with flashes of the finest sensibility and poetic sensitivity, as for example his description of night sounds in the swamp or the approach of sundown up some lonely bayou.

The *Swamp Doctor* had been summoned to his first patient by an old Negro servant riding a mule. His mistress had been afflicted with fits, apparently provoked by the unfortunate destruction of her whiskey barrel. After the doctor had resuscitated the patient with brandy from a bottle labeled "Arkansas Fitifuge," he repaired for the night to a detached house in company with a delegation of neighborhood crones. As the night waned:

> Suddenly one of those small screech or horned owls, so common in the South and West, gave forth his discordant cry from a small tree, distant only a few feet from the house. Instantaneously every voice was hushed, all of the lower jaws of the old women dropped, every eye was dilated to its utmost capacity till the whites looked like a circle of cream around a black bean, every forefinger was raised to command attention, and every head gave a commiserative shake, moderating gradually to a solemn settling. After a considerable pause Miss Ripson broke the silence. "Poor Creetur! She's gone, Doctor. The Fitifuge can't cure her. She's knit her last pair of socks! Blessed Master! The *screech owl* is hollered and she's bound to die, certin!" "Certin " every voice belonging to the females responded, and every head besides nodded a mournful acquiescence to the melancholy decision.

Professor Anderson has, in a warm, discerning way, resurrected a notable figure in American letters and another doctor whose achievements were more literary than medical.

SIR GEORGE THOMSON. *The Inspiration of Science.* New York, Oxford University Press, 1961. x, 150 pp., 20 illus. $4.00.

Reviewed by BURNABY MUNSON, *Research Chemist, Humble Oil and Refining Co., Baytown, Texas.*

The Inspiration of Science contains a well-written, qualitative discussion of the fundamental physics of the structure of matter, a brief history of the developments of some of the accepted concepts in atomic theory, several anecdotes about physicists who were at least acquaintances of Sir George Thomson or his father, J. J. Thomson, and useful tidbits concerning methods and motivation for research in pure science. It is written in an interesting and clear style which will make the less intuitively obvious concepts of the structure of matter seem as familiar and obvious as concepts of macroscopic objects. The reality of an electron is essentially the same as that of an apple; it is the familiar edibility of an apple which makes it more easily acceptable. The electron is becoming so universally accepted now that it is almost shocking to be reminded that the "proof" of its existence has come so recently.

The author discusses the art involved in scientific research based upon his own experiences; his observations are certainly not limited to experiments in physics. Since research on almost anything is popular now, this emphasis on the difficulty of predicting the nature of results is beneficial. For those involved in research it is always heartening to be reminded of the luck involved in many famous discoveries. The unbounded optimism that a Nobel Prize lies within a research project must be tempered with the knowledge that a considerable amount of ingenuity is required to decide which, if any, of the apparently trivial bits of data are of significance.

This book will be useful in helping its readers to become familiar with some of the fundamentals of the complex technology which surrounds them. It shows the tremendous growth which has almost completely separated the fields of science and made it virtually impossible for anyone to become an expert in more than one subdomain of science. Although this is so, indifference to and ignorance of science and technology are becoming increasingly difficult for even the most determined individual to maintain.

At less than three cents a page, with illustrations and a political cartoon as additional values, this book is well worth reading.

JOHN H. RAACH. *A Directory of English Country Physicians, 1603-1643.* London, Dawsons of Pall Mall, 1962. 128 pp. 21s.

Reviewed by EDWIN CLARKE, *Department of the History of Science and Medicine, Yale University.*

To gain an accurate impression of a country's medical profession during any early period of its development is never easy. The picture is obviously distorted by the quite justifiable emphasis placed on the individuals whose contributions to the progress of medical thought were outstanding. But those whose professional activities were not recorded and yet who formed an essential part of the profession are usually overlooked. It follows that their obscurity makes the task of resurrection a laborious one, but it is also essential if a balanced view of medical practice is to be achieved.

Dr. Raach, himself an American general practitioner, has elected to do this for the 814 licensed physicians, as distinct from surgeons, who were practising outside London in the forty years between the accession of James I in 1603 and the abolition of episcopacy in 1643. As he rightly points out, Munk's *Roll of the Royal College of Physicians of London* has been unwittingly responsible for laying undue emphasis on the London physicians so that rural practitioners have been ignored, and at times their very existence has even been doubted. The famous Statute 3 Henry VIII of 1511 placed countrywide control of the profession in the hands of the Church and the universities, and this has determined the author's restricted period as well as his sources. The latter are of three kinds: the diocesean records of license certificates and of wills from the same source, and the alumni directories of

Oxford, Cambridge, and of the continental medical schools popular at this time.

The lists of names (pp. 21-128), which are preceded by a short introduction, are collected in two groups: those appearing in the records of the Province of Canterbury and those of the Province of York. Within each group the individuals are firstly arranged alphabetically with their dates, degrees, and places of residence, if these facts are known, and with biographical references if available. Then comes a listing according to county and town or village.

The author seems to ignore the fourth volume of Munk's *Roll,* and the account of medical education (p. 11), although purposely abbreviated, is, even so, somewhat distorted. There is confusion in the order of the notes documenting the introduction, and in the lists of physicians it would have been better to collect the bibliographical abbreviations together rather than record each one as it is encountered.

Dr. Raach's labors must have been immense and he is to be congratulated for bringing to light a mass of information, much of which has been till now buried in manuscript archives. It will serve to indicate social, economic, and geographical problems of early Stuart medicine and it may stimulate others to tackle them.

DAVID A. KRONICK. *A History of Scientific and Technical Periodicals: The Origins and Development of the Scientific and Technological Press, 1665-1790.* New York, The Scarecrow Press, 1962. 274 pp. $6.50.

Reviewed by WILLIAM K. BEATTY, *Librarian and Professor of Medical Bibliography, Northwestern University Medical School.*

IN 1782 Christian Gottfried Gruner wrote: "The majority of physicians are surfeited to the point of illness by the reading of journals." Although Dr. Kronick resisted the temptation, he might have followed this quotation with the statement that the situation is even worse today. The birth and development of such powerful agents for the transmission of scientific information are matters of considerable interest. In this volume Dr. Kronick has described the origin and first century and a quarter of growth of the scientific journal as we know it today.

In the preface the author points out that this history could have been handled bibliographically, sociologically, historically, or as a study of publication and distribution. He has chosen to treat the subject primarily by a discussion of the forms these journals took and secondarily by a survey of their contents and of the pertinent bibliographical controls.

Dr. Kronick selected the journals for this study from four major lists: three were general compilations made in this country, and the fourth was a national list produced in Germany. He was able to examine about one third of the slightly more than one thousand titles obtained in this way. These

journals, with the addition of a few more that the author turned up in the process of collecting his material, form the basis for this study.

Dr. Kronick begins the text with a discussion of the many definitions of a periodical. He then sets the historical background for the birth of this form of publication with an examination of the periodical's antecedents and of the scientific atmosphere of the period. He groups the periodicals themselves into original publications (substantive journals and proceedings of societies), derivative publications (abstract and review journals, collections), dissertations, and almanacs and annuals. These groups are illustrated by examples and quotations. The next two chapters contain comments on the relationship between the scientific and the general periodical, and on the bibliographical control of them. The last chapter summarizes the book and suggests that scientists should look to some other form of publication to take the place of the over-worked periodical of today.

This book is an abridged version of the author's doctoral dissertation which was completed in 1956. Unfortunately, the text was not brought up to date when it was converted into book form, and several important contributions to the subject, made during the past six years (one by the author), have not been included. Contemporary sources have been used to illustrate some of the points, and the list of references will be of value to future workers in this area. The index, although it is adequate in most cases, shows some inconsistencies and errors that hamper its usefulness. The proof-reading is not of the quality that one would expect in such a book.

Dr. Kronick has provided some of the historical background that future investigators will need when they examine the more specific problems in the history of the scientific periodical. This is the only major book in the field, and the author has done a commendable piece of work.

JUDSON BENNETT GILBERT. *Disease and Destiny, A Bibliography of Medical References to the Famous. With Additions and an Introduction by Gordon E. Mestler.* London, Dawsons, 1962. 535 pp. £6.10.0.

Reviewed by GERTRUDE L. ANNAN, *Librarian, New York Academy of Medicine.*

HISTORIANS, biographers, and librarians will welcome with enthusiasm this valuable index which brings to light a varied and vast amount of information. The casual reader can find references to articles telling how Caruso died, or of the illnesses of Catherine the Great, the heredity and sterility of Catherine de Medici, the deafness of Beethoven, the addiction of De Quincey, the medical history of Samuel Johnson. The biographer will find references to more than fifty articles on Vincent van Gogh, more than 300 on Napoleon, 150 on Rousseau, 30 on Bismarck. No longer will the librarian need to spend hours struggling to find for a reader descriptions of the diseases and deaths of famous people hidden in the works of Cabanès, Witkowski, MacLaurin, Major, Myers, Gould, Bychowski, and many more, for they were carefully culled by Dr. Gilbert until his death in 1950. Dr. Gilbert was fortunate in

having a disciple who willingly devoted himself to the lengthy task of preparing the mass of material for publication and bringing it up to date with articles appearing after 1950. In his introduction Mr. Mestler cites the impressive roster of titles whose contents provided the thousands of references painstakingly gathered.

The names of the famous of all periods are arranged alphabetically. The references to books and journals are listed chronologically under the biographee. The kind of information sought is described by Mr. Mestler, p. 11, as: 1. Medical information concerning the person himself; 2. Medical analyses, usually of a psychopathological nature, concerning the *works* of the person; 3. Biographical or memorabilia; 4. Relations of the person to medicine and doctors; 5. Descriptions of the state or condition of contemporary medicine in the time of the person. This seems an ambitious project to any who are aware of the amount of material published on the fascinating subject of the ills of the royal families, of dictators and generals, of writers and artists, of men and women, famous and infamous. Did Julius Caesar have epilepsy? And if so, how did it affect his destiny and the world of his time? What did Coleridge's poetry owe to his opium habit? Did Mozart suffer mercury poisoning? Physicians and authors have long probed such questions and studied contemporary accounts and medical records. This bibliography provides abundant assistance for those who look for the medicine of history.

The provocative title of the book, however, does not do its contents full justice, for Dr. Gilbert included several other unmentioned categories: great literary figures who have referred to medicine; physicians who achieved renown outside of medicine—medical truants as they have been called; non-medical men who have made medical contributions. The medicine of literature is a proper accompaniment of the medicine of history, and a subject receiving equal attention from writers. Shakespeare alone covers pp. 465-478 with references from 1829 (Wadd, "A medico-chirurgical commentary on . . . ," *Quart. J. Sci. roy. Inst.*, no. 234) to 1957 (Swan, "Shakespearean references to disease and medicine," *London Hosp. Gaz., 60,* 40-44). Other great names are well represented, among them Cervantes, Chaucer, Chekhov, Cicero, Dickens, George Eliot, Juvenal, Molière, Sainte-Beuve. The other categories seem less appropriate here, less exhaustively covered, and of less importance to the historian. Among the medical men of letters are Goldsmith and Keats, Bridges and Somerset Maugham, but the names of Merrill Moore and William Carlos Williams do not appear. Guillotin is here because of his invention, a doubtful choice, but why Théophraste Renaudot, why Frederic II and his medical regulations? If these are here, surely hundreds of others should be.

To complain of a surfeit is ungenerous when so much is provided, but the book would be the better for the weeding of such entries. The volume shows the meticulous attention of the late Mr. W. J. Bishop who saw it through the press, maintaining a high degree of accuracy. It will serve as

an invaluable tool to the historian and a delight to the reader who seeks the odd and unusual in medical history.

A. LAKSHMI PATHI. *A Text-Book of Ayurveda* (Ayurveda Siksha). Vol. I, Section I, *Historical Background;* Vol. I, Section II, *Philosophical Background.* 2d ed. Jamnagar, India, Jain Bhaskarodaya Press, n.d. 596, 576 pp.

Reviewed by MARTIN LEVEY, *Research Associate, Department of History of Science and Medicine, Yale University School of Medicine.*

IN these first two volumes of a series on Hindu medicine, the author has set himself the difficult but worthwhile task of introducing the background of Ayurveda. Of the vast mine of information in Sanskrit on medical matters, comparatively little has been brought to the attention of the West. As a fully developed system, Indian medicine was referred to often in the Arabic of ibn Sīnā, al-Rāzī, Serapion, ibn al-Waḥshīya, and many others. Charaka, one of the six ancient Sanskrit authorities on the Ayurveda, is frequently found mentioned in early Latin texts.

The Ayurvedic system, of which Charaka was the greatest exponent, is based on three body humors, *vayu* (wind, vital, or nerve force), *pitta* (bile), and *kopha* (phlegm, builder of tissue). These three which exist in equilibrium are derived from the five matters of the universe: ether, air, fire, water, and earth. Since there is the possibility that Hippocrates borrowed some of these ideas from the Hindus, it is of value to study the philosophical background of Ayurveda. This is given in great detail by the author, often in a very readable fashion. Topics covered in the philosophical volume are the Nyaya system, Sankhya, Yoga psychology, Porva, Vedenta, Siddhas, Charvaka, Jainism, Ayurveda, and many other theoretical matters in relation to various other facets of Indian science and medicine.

In the historical volume there is a plethora of material on the Hindu Dharma, ancient India and its universities, history of Ayurveda, Vrikshayurveda, ancient town planning, civic administration in ancient India, and present-day methods in Hindu medicine.

The two volumes are a treasury of information. Unfortunately, the author is not unbiased so that a student would find it difficult to separate fact from enthusiasm. The table of contents in each section, the indices, and the chronological tables are very useful.

SUESSMANN MUNTNER, Ed. *Moshe ben Maiman's Medical Works.* Vol. III: *Commentary on the Aphorisms of Hippocrates.* Jerusalem, Mosad Harav Kook, 1961. Pages v-xiv in English, i-xxxv and 1-166 in Hebrew.

Reviewed by MARTIN LEVEY, *Research Associate, Department of History of Science and Medicine, Yale University School of Medicine*

THE first volume of this important series was reviewed in this journal, in volume XIII (pp. 564-566) by Dr. Joshua Leibowitz, the second (with addi-

tional comments on volume I), in volume XVII (pp. 208-210). The general excellence of the first two volumes is repeated in this welcome new addition. Dr. Muntner has studied the Hebrew text of Moses ibn Tibbon together with the Greek text. The many fine notes to the Hebrew text make it eminently readable. There are English and Hebrew prefaces and Hebrew and Latin indices.

DENIS LEIGH. *The Historical Development of British Psychiatry.* Volume I. *18th and 19th Century.* Oxford, Pergamon Press, 1961. 277 pp. $10.

Reviewed by GEORGE MORA, *Medical Director of the Astor Home for Children, Rhinebeck, New York.*

As the author tells us in the preface, this book has resulted from his dissatisfaction with previous historical works on British psychiatry, his admiration for the great pioneers in the treatment of mental diseases, and his long interest in collecting old books on psychiatry.

The book is centered around the figures of three pioneers of psychiatry: John Haslam (1767-1844), James Cowles Prichard (1786-1848), and John Conolly (1794-1866). Dr. Leigh has traced a detailed, accurate, and sympathetic profile for each of these men. The presentation is always agile and attractive, and the insertion of a number of excerpts from the original sources adds a touch of contemporary color and style. Thus, in dealing with therapy during the eighteenth century, we learn that, according to the very popular *Medicina Gymnastica* by Francis Fuller (1705), it was important indeed to find a horse that entirely suited the patient's humour:

> . . . and then it will not be easie for him to delight in a Creature which will perform all he expects from him, that takes Pleasure in what he is put upon, and delights in his Rider; a Creature which (considering the many other Beasts that are Serviceable for Draught or Burden) seems to be made almost only for the Defence, the Pleasure and Health of his Master; and which has so many excellent Qualities above all other Beasts, that there is no Man upon Earth, whose Gravity or Dignity is so great, as not to allow him with Some Pleasure to take Notice of 'em.

Dr. Leigh also discusses the status of mental hospitals, the practice of blood letting, of cupping and scarifying, the methods of mechanical restrictions of the patients, and many other aspects.

In regard to John Haslam, Dr. Leigh has shown that he is probably not the author of the famous *Sketches in Bedlam* nor is he the discoverer of general paralysis. On the other hand, his account of schizophrenia is of much greater historical significance than he has been given credit for. Prichard, whose name has been traditionally attached to "moral insanity," was not only a psychiatrist but an anthropologist and a linguist of distinction as well. Conolly, for whom reputation and success arrived late and unexpectedly following his publication of the non-restraint system, was, as

a result of this system and his interest in physiognomy and phrenology, a very controversial figure.

As a consequence of the focus of the book on three major figures, the first chapters on the eighteenth century may be insufficient. For instance, the foundation of the Retreat of York by William Tuke, a major event in the history of psychiatry, is dealt with almost incidentally on one page; King George III's mental illness is presented in detail, but no mention is made of its description by the American psychiatrist, Manfred Guttmacher, in *America's Last King* (1941). Dr. Leigh does not make any effort to present British psychiatry in the context of psychiatric developments in other nations—either on the European continent or in this country. Consequently, in the discussion of legal psychiatry and of the McNaghten Rules (p. 130), there is no mention of Isaac Ray and of his classic, *Medical Jurisprudence and Insanity* (1838), in spite of the fact that it was, at McNaghten's trial, quoted at length by Alex J. E. Cockburn, then Chief Counsel for McNaghten's defense. To mention one additional point, William Cullen greatly influenced not only British psychiatry (p. 33), but psychiatry in general, since his work was translated by Pinel in 1785. However, these are minor points which do not detract seriously from the value of the book. One cannot but feel admiration for Dr. Leigh's work and hope that the second part of it will be available soon.

CHANDLER MCC. BROOKS, JEROME L. GILBERT, HAROLD A. LEVEY, and DAVID R. CURTIS. *Humors, Hormones, and Neurosecretions. The Origins and Development of Man's Present Knowledge of the Humoral Control of Body Function.* New York, University Publishers, Inc., 1962. 313 pp., 15 illus. $7.50.

Reviewed by R. H. FOLLIS, JR., *Chief, Nutritional Pathology Branch, Armed Forces Institute of Pathology, Washington 25, D. C.*

WHEN asked to review this book, I willingly accepted, for the title, *Humors, Hormones, and Neurosecretions,* is an intriguing one. Moreover, the title is further characterized as, *The Origins and Development of Man's Present Knowledge of the Humoral Control of Body Function.* One looked forward to an ample discussion of the evolution of humoral pathology, which began back in the times of Empedocles and Pythagoras, when the concept of the importance of the interrelations of blood, phlegm, yellow bile, and black bile was introduced. The whole development of the meanings of *humor* or *humour,* words which fill the English vocabulary, stems from these early ideas. But I was to be disappointed. Only cursory mention of Pythagoras and a few other ancients by name is found. The four humors are not even specified, and virtually nothing is said about the etymology of the word, *humor,* a subject which has been discussed so interestingly by others, for instance David Hannay in such an accessible source as the eleventh edition of the *Encyclopaedia Britannica.*

The remainder of this book reveals the same superficiality. There is a history of endocrinology, but this is largely a listing of bare contributions of men and their dates. Such treatment one expects to find, and does so, in any textbook of physiology. Virtually nothing is said of the comparative anatomy and physiology of the endocrines, an approach which is imperative if one is to have some inkling of the significance of these glands for man. The sections on neurosecretions reveal a similar weak approach.

What are the reasons for a publication such as this? The *Preface* states that "it is proper for physiologists to consider the history of their disciplines." True and worthy enough, yet far more elaborate treatises of endocrinology and neurosecretion are available. "Secondly, this represents a continuation of a departmental interest in history." Such is laudatory but does mere interest justify a pedestrian publication? Finally, the book is said to represent an effort "to summarize present knowledge of a growing diverse but fundamental subject." This is accomplished, but in a superficial way. The first-year student will find a similar treatment in his textbooks. After that he will wish to consult more authoritative works.

To me this publication is another example of a trend of our times: the printing of page after page of material which is merely a reiteration of what is already available. Today there is a growing tendency to write reviews which are merely that, with no or little effort to derive new principles or to develop any critique of past contributions. After closing the volume under discussion I could not help but recall something I once heard the late Dr. Homer Smith say, "In designing a library for the future I would build a capacious incinerator close to the receiving desk, not so close that its fires, which will have no interruption, will over-heat the clerk, but close enough so that its open door can be hit by any amateur pitcher with slight experience." Today's revolution in the publication of so much material which could bypass the library and reach the incinerator directly is now in full tide. When, Dear Lord, is the counter-revolution to get underway?

BOOKS RECEIVED OCTOBER-DECEMBER 1962

Levey, Martin. *Mediaeval Arabic Bookmaking and its Relation to Early Chemistry and Pharmacology.* Philadelphia, The American Philosophical Society, 1962. 79 pp. (*Transactions of the American Philosophical Society,* Vol. 52, Part 4.) $2.00.

Stookey, Byron. *A History of Colonial Medical Education in the Province of New York, with Its Subsequent Development (1767-1830).* Foreword by H. Houston Merritt. Springfield, Ill., Charles C Thomas, 1962. xix, 286 pp., illus. $10.50.

Hall, D. P. *Our Surgical Heritage.* Foreword by Robert M. Zollinger. New York, The Reuben H. Donnelley Corporation, 1962. (Reprinted from *The American Journal of Surgery.*) viii, 80 pp., illus. $6.00.

Clark-Kennedy, A. E. *The London. A Study in the Voluntary Hospital System.* Vol. I. *The First Hundred Years, 1740-1840.* London, Pitman Medical Publishing Co. Ltd., 1962. xii, 264 pp., illus. 30s.

Smith, George Winston. *Medicines for the Union Army. The United States Army Laboratories During the Civil War.* Foreword by Glenn Sonnedecker. Madison, Wisconsin, American Institute of the History of Pharmacy, 1962. v, 119 pp., 8 illus. $2.75.

Dubos, René J. *The Unseen World.* Foreword by Detlev W. Bronk. New York, Oxford University Press, 1962. 111 pp., illus. $4.75.

Poynter, F. N. L. *A Catalogue of Printed Books in the Wellcome Historical Medical Library.* Vol. I. *Books Printed Before 1641.* Foreword by Sir Henry Hallett Dale. London, The Wellcome Historical Medical Library, 1962. xv, 407 pp. £10.10s.od.; $30.00, post free.

Martí-Ibáñez, Felix. *The Epic of Medicine.* New York, Clarkson N. Potter, Inc., 1962. xiv, 294 pp., 33 colored illus., 240 black and white illus. $15.00.

Dewing, Stephen B. *Modern Radiology in Historical Perspective.* Foreword by Maxwell H. Poppel. Springfield, Ill., Charles C Thomas, 1962. ix, 189 pp. $5.75.

Smeaton, W. A. *Fourcroy: Chemist and Revolutionary 1755-1809.* Cambridge, England, W. Heffer and Sons Ltd., 1962. xxi, 288 pp., 7 illus. 40s. ($6.00).

Guerra, Francisco. *American Medical Bibliography 1639-1783.* New York, Lathrop C. Harper, Inc., 1962. 885 pp. $45.

Bennett, Joan. *Sir Thomas Browne.* Cambridge, University Press, 1962. viii, 255 pp. $5.50.

Guthrie, W. K. C. *A History of Greek Philosophy,* Vol. I. New York, Cambridge University Press, 1962. xv, 539 pp. $10.00. (55s.).

Weiss, Harry B. and Kemble, Howard R. *They Took to the Waters.* Trenton, New Jersey, The Past Time Press, 1962. 232 pp., illus. $6.00.

Davenport, William H. *The Good Physician.* New York, The Macmillan Co., 1962. x, 564 pp. $7.50.

Thornton, J. L. and Tully, R. I. J. *Scientific Books, Libraries and Collectors.* London, The Library Assoc., 1962. xiii, 406 pp., 16 illus. $10.05. (7.66 to members of Lib. Assoc.)

Greenfield, Myrtle. *A History of Public Health in New Mexico.* Foreword by Karl F. Meyer. Albuquerque, New Mexico, The University of New Mexico Press, 1962. xv, 383 pp. $5.00.

Sarton, George. *Sarton on the History of Science.* Dorothy Stimson, Ed. Cambridge, Mass., Harvard University Press, 1962. xvi, 383 pp. $10.00.

Moorat, S. A. J. *Catalogue of Western Manuscripts on Medicine and Science in the Wellcome Historical Medical Library.* Vol. I. *Manuscripts written before 1650 A.D.* London, The Wellcome Historical Medical Library, 1962. vii, 679 pp. £10. 10*s.* 0*d.*; $30.00, post free.

Cushing, Harvey. *A Bio-Bibliography of Andreas Vesalius.* 2nd ed. Hamden, Connecticut, Archon Books, 1962. vii, xxxviii, 264 pp., illus. $22.50.

Ivy, Robert H. *A Link With The Past.* Baltimore, The Williams and Wilkins Company, 1962. vii, 148 pp., illus. $4.00.

Hahn, André, Dumaitre, Paule, and Samion-Contet, Janine. *Histoire de la Médecine et du Livre Médical.* Paris, Olivier Perrin, Editeur, 1962. 430 pp., illus.

NOTES ON CONTRIBUTORS

L. R. C. AGNEW, M.D., M.A., is Associate Professor of the History of Medicine and Chairman of the Department at the University of Kansas School of Medicine, Kansas City, Kansas.

WILLIAM COLEMAN, Ph.D., is Assistant Professor of History of Science, Department of History, Johns Hopkins University, Baltimore, Maryland.

FRANK H. ELLIS, Ph.D., is Assistant Professor of English Language and Literature at Smith College, Northampton, Massachusetts.

THOMAS GIBSON, M.B., Ch.B., F.R.C.S. Ed., F.R.F.P.S. Glas., is Consultant in Plastic Surgery, Royal Infirmary, Glasgow, Scotland.

ARCHIBALD L. GOODALL, M.D., D.P.H., F.R.C.S. Ed., F.R.F.P.S. Glas., is Hon. Lecturer in Surgery, University of Glasgow, and Hon. Librarian, Royal Faculty of Physicians and Surgeons, Glasgow.

LESTER S. KING, M.D., is an Editor of the *Journal of the American Medical Association,* 535 North Dearborn Street, Chicago 10, Illinois.

GENEVIEVE MILLER, Ph.D., is Assistant Professor of the History of Medicine, Western Reserve University School of Medicine, and Curator of the Howard Dittrick Museum of the Cleveland Medical Library Association, Cleveland, Ohio.

ALEXANDER PETRUNKEVITCH, Ph.D., eminent authority on spiders, is Professor Emeritus of Zoology, Yale University.

LEONARD TUSHNET, M.D., is a practising physician residing at 572 Prospect Street, Maplewood, New Jersey.

The First Experiments on Transfusion in France*

HEBBEL E. HOFF** and ROGER GUILLEMIN***

THE issue of the *Philosophical Transactions* for Monday, 19 November 1666, carrying a short paragraph headed "The Success of the Experiment of Transfusing the Blood of one Animal into Another," gave the first public intimation of the accomplishment of "this experiment, hitherto look'd upon to be of an almost insurmountable difficulty," which "hath been of late successfully perform'd not only at *Oxford,* but also in *London,* by order of the *R. Society,* at their publick meeting in *Gresham Colledge*: the Description of the particulars whereof, and the *Method of Operation,* is referred to the next opportunity."[1]

This promise was fulfilled in the next number with a description of "The method observed in Transfusing the Blood out of one Animal into Another." It was written by Richard Lower in Oxford to Robert Boyle, and while it then bore no date, it was in fact[2] the account written on 6 July 1665 and imparted by Boyle to the Royal Society, leading to the successful transfusions of November 1666 at the Royal Society.

It is amply clear that these experiments had their inception in the proposal by Christopher Wren to Robert Boyle, Dr. Wilkins, and others that he could contrive to inject liquids immediately into the blood stream in dogs by means of syringes improvised from quills and bladders.[3] A short description of experiments employing this method in Boyle's *Usefulness of Experimental Philosophy* (pp. 62-64 of the 1663 edition) was included in "An account of the rise and attempts of a way to convey liquors immediately into the mass of blood."[4] From the account given by Timothy Clarck, these took place in 1656-1657 or thereabouts.[5]

This history of intravenous injection, as it appeared in the seventh number of the Transactions[6] was apparently the hint that led the Royal Society to propose a trial of transfusion, for which they gave an order

* Supported by USPHS Grant RG 6518.

** Department of Physiology, Baylor University College of Medicine, Houston, Texas.

*** Laboratoire de Morphologie Experimentale et Endocrinologie, College de France, Paris.

1 The success of the experiment of transfusing the blood of one animal into another. *Phil. Trans.*, 1665-66, *1*, 352.

2 Lower, Richard. *De corde.* London, 1669. K. J. Franklin, Tr. *In:* Gunther, R. T. *Early science in Oxford.* Oxford, 1932. Vol. IX, pp. 180-181.

3 Lower, Richard. The method observed in transfusing the blood of one animal into another. *Phil. Trans.*, 1665-66, *1*, 353-358.

4 *Phil. Trans.*, 1665-66, *1*, 128-130.

5 Clarck, Timothy. A letter, written to the publisher by the learned and experienced Dr. Timothy Clarck, one of his majesties physicians in ordinary, concerning some anatomical inventions and observations, particularly the origin of the injection into veins, the transfusion of blood, and the parts of generation. *Phil. Trans.*, 1665-66, *1*, 672-682.

6 See note 4.

Copyright 1963 by JOURNAL OF THE HISTORY OF MEDICINE AND ALLIED SCIENCES, Inc.

at their public meeting of 17 May 1665. Soon after Lower's successful experiments, transfusion was also practised before the Royal Society in London.[7] Lower dates his first public demonstration "towards the end of February, 1665," and mentioned the presence of John Wallis, Savilian Professor of Mathematics, who, according to Boyle, carried the information concerning it to a meeting of the Royal Society.[8]

In Paris the new philosophy was also flourishing. The group that was to become the French Academy began meeting as a simple gathering of friends around 1600; it was given official recognition and made an instrument of the State by Richelieu, being directed "to labour with all the care and diligence possible to give exact rules to our language and to render it capable of treating the arts and sciences."

Somewhat later, another group began meeting in Paris to discuss the new sciences and to make experimental studies; their intellectual model was Descartes, much as Bacon had been for the Royal Society. In 1666 Colbert, the great successor to Richelieu, organized this group under the patronage of Louis XIV as the Académie des Sciences and gave its scientists royal annuities and laboratory space in the Louvre, directing them to work at all those things of science that could increase knowledge and benefit the nation. Thus the members of the Académie worked not only at the basic sciences of mathematics, astronomy, anatomy, physics, chemistry, geography, etc., but they also made surveys of the nation's physical needs and the means of meeting them, planning for improvement of roads, canals, and ports, increasing the yield of field and vine, improving farm animals, preserving wine, making bread, increasing the supply of metals, testing the purity of the coinage, establishing standard weights and measures, augmenting the production of gunpowder, forecasting the weather; in sum, all the multitudinous technologies of peace and war were fostered.

To this new Academy there came in the last days of 1666, or early in 1667, news of the success of the English experiments on transfusion; the issues of the Transactions of 19 November and 17 December 1666 themselves would have borne all the essential data; the private correspondence of Oldenburg might well have anticipated the printed announcement. As it was later described in an outline of the activity of the Académie for its earliest years, published in 1733,

> at about this time there was much noise concerning a new discovery, for which the English had all the glory, but which the French perfected from day to day; it was the famous Transfusion of Blood, founded upon the circulation, which seemed to promise, along with an infinity of unusual experiments, the cure of all diseases of the blood, and an almost complete transformation of medicine. This operation, which had at first

[7] An account of more tryals of transfusion, accompanied with some considerations thereon, chiefly in reference to its circumspect practise on man; together with a further vindication of this invention from usurpers. *Phil. Trans.*, 1665-66, *1*, 517-525.

[8] Note 2, p. 174.

been attempted only on dogs, became so easy that it began to be practised at great risk on man; some philosophers already carried their ideas so far as to believe that by transfusion one might change vicious characteristics, and that the blood of a lion, for example, would cure cowardice, but what affected everyone even more was the hope of rejuvenation.

A matter so important was examined in the Academy. The operation there was made on dogs seven times, and it did not succeed as it did in England, or even in France among the supporters of transfusion. In the first experiment, the dog that received in one of its veins the blood that came out of one of the arteries of another, died, and the right ventricle of the heart and the superior vena cava were found filled with clotted blood. In the other experiments, the recipient of the blood was almost always greatly enfeebled, while the donor was very well, which is again directly contrary to the intention of the transfusion. It seems always that the blood that passes from one into the other clots in the veins of the recipient, and from this it is judged that but little of it passes.[9]

Some echoes of these experiments did reach the scientific world at the time. The issue of the *Philosophical Transactions* of Monday, 3 June 1667, contained a short "Extract of a letter written from Paris, containing an Account of some Effects of the Transfusion of Blood," in which the writer mentioned that "I was present, when Mr. Gayant shew'd the Transfusion of the Blood, putting that of a young Dog into the Veins of an Old, who for two hours after, did leap and frisk; whereas he was almost blind with age, and could hardly stir before." Another reference appeared in the issue of 21 October 1667 in the form of a review of a recently published letter by "that French Virtuoso, Jasper de *Gurye de Montpoly*" which was included in "An Account of more Tryals of Transfusion, *accompanied with some* Considerations *ther'on, chiefly in reference to its circumspect Practise on Man; together with a farther* Vindication *of this* Invention *from Usurpers.*" Describing an example of imperfect success of transfusion in the dog, the account continues:

Concerning the other *Instance, viz.* of the *Dogg*, the *Letter* affirms, that that Tryal was made by Monsieur *Gayen* with great exactness, after this manner. He drew three great dishes of Blood from the Dog that was to receive, and weighed the other Dog that was to furnish; and, the operation being perform'd, he weighed him again and found him to weigh less than he did by two pounds; of which, having abated an *ounce* more or less, for the Urine, made by the Dog, and an *ounce* or *two* more for the Blood spilt in the Operation, there remained at least one *pound* and a *half* of Blood, that was transfused. But, the *Recipient*, though well dress'd, and well fed, died five days after, the *Immitent* being alive. Whence it seems evident to this *Writer*, that the *too large* Intromission of *new* Blood was predominant over the *Native*, and, as 'twere, overwhelm'd it. Whence he again inculcates the dangerousness of infusing *too much* Blood at once, in regard that such Blood being now separated from the Principle of life it had in the *Emittent*, and yet destitute of the stamp necessary to live the life of the *Recipient*, it could not be moved and assimilated by the

[9] *Histoire de l'Académie royale des sciences, depuis son établissement au 1666 jusqu'à 1686.* Paris, Martin, Coignard, and Guerin, 1733. Vol. I, pp. 37-38.

live Blood, which remained in the *Recipient,* and the *Fermentation,* that was made, passed rather to an Eagerness or Sowerness, than to such an one as precedes Digestion. And this kind of eager acidity he *intimates* was seen by the Spectators, and felt by the Receiving Animal, which swounded, and remained as dead for half a quarter of an hour: And when some alledged, that the Dog died, because he was wounded in the neck, where he could not lick himself, which rendered his wound incurable, answer was given, that Experiments had been made, wherein not only a Vein was opened, but also an Artery, yea, even the *Aspera arteria* cut of a Dog, that could not lick himself, and yet survived.

While neither of these experiments can be identified in the account of Gayant's experiments recorded in the minutes of the Académie des Sciences—unless a considerable allowance be made for exaggeration—there were indeed seven experiments made at some of the very first meetings of the Académie, which officially began its activities in 1667. The minutes of these meetings have apparently never been located, as they were retained by the individual members and were never deposited in a central library. The completed accounts of experiments performed before the Académie were, however, preserved, and constitute a considerable treasure of unpublished material, for by 1733, when the first volume of "*Histoire de l'Académie Royale des Sciences* appeared, the Editor proposed to give only abbreviated résumés of the collected works, rather than publish them *in extenso,* which, he complained, "would make several large volumes and entire treatises on chemistry, mechanics, astronomy, geometry, etc."[10]

This first French account of transfusion, forerunner of its meteoric rise, application to man, and equally rapid decline and extinction because of the opposition of the Faculty of Medicine and prohibition by an order of the Parliament of Paris of 17 April 1668, came to our attention through the kindness of Madame Pierre Gauja, Secretaire-Archiviste of the Académie des Sciences; Dr. Robert Courrier, permanent secretary of the Académie, graciously gave permission to microfilm the document, which we have translated as literally as possible. It gives a picture of the concept of the circulation only a few years after *De Motu Cordis,* and before Lower pointed out its respiratory function. Its physiology is still galenical, and its experimental approach is largely diluted with scholastic argument, but there is an attempt at quantitation and a demand for more accuracy in measurement, along with suggestions for further experiments.

Little can be said about the authorship of this report. The inexact reports of these experiments in England include only the name of Gayen. The manuscript minutes of the Académie des Sciences for 31 December 1666 mention that "Last Thursday Messrs. Perrault, Auzout and Gayen performed the experiment on the transfusion from one dog to another. A cannula was placed in the carotid of the larger and the vein of the smaller. The blood which passed with impetuosity into the little dog

[10] *Ibid.,* p. 17.

quickly stifled it, because it was given no exit. The dog being opened, the heart and all the veins were found full of blood."

Adrien Auzout, one of those mentioned, was an astronomer and cannot be seriously considered as other than an assistant. Louis Gayen, an original member of the Académie representing anatomy and a Surgeon of Paris and of the Armies of the King, must perhaps have been a central figure in the experiments, because his is the only name mentioned in the original manuscript. Claude Perrault's association is much more open to question. A physician, he had at this time largely given up the practice of medicine and devoted himself to architecture; the famous Colonnade of the Louvre is of his design, and he is also responsible for a remarkable illustrated edition of Vitruvius. His quality as a physician is usually deprecated, probably without reason, because he was the target of a number of Boileau's most biting epigrams; one of which can be translated:

> Yes, I have spoken in verse of a celebrated assassin
> Who leaving the infertile science of Galen
> From an ignorant physician became a clever mason.
> But to speak of you I had no design
> Perrault; my muse is too exact.
> You are, I vow, an ignorant physician,
> But not an expert architect.

In 1673 Gayen died, possibly in the line of duty as a military surgeon, after the bloody attacks at the siege of Maestricht that cost the life also of the redoubtable d'Artagnan. In 1688, the year of his own death, Perrault published a four-volume compendium of his works and as the last item included the Académie article altered but slightly.[11] All mention of Gayen is removed from the text, but the implication is by no means clear that Perrault claims authorship, and his Introduction carefully avoids explicit mention of this point. The reader will notice numerous references to architecture in the original text that definitely point to Perrault's participation if not to his complete authorship. In the light of our present incomplete knowledge, attribution of the work jointly to Gayen and Perrault is probably justified. The Académie manuscript contains the two figures included here, executed in water color with diluted India ink. Both were reproduced as woodcuts (reversed) in Perrault's printed report. In the following translation Perrault's additions to the original manuscript are included in brackets; his deletions from it are designated by parentheses.

An explanation for the failure to follow this promising line of investigation in further detail, or to publish the results of this first series at the time they were performed, apart from the reasons put forward by Perrault in the Introduction that follows, may perhaps be inferred from a letter from Gui Patin to his physician friend Falconet in Lyon. (Patin, ardent phlebotomist though he was, apparently failed to mention trans-

[11] Perrault, Claude. *Essais de physique ou recueil de plusieurs traitez touchant les choses naturelles.* Paris, Coignard, 1688. Vol. IV, 7 *ll.*, 438 pp.

fusion in any of his published letters.) The War of Devolution or the Queen's War began in the spring of 1667, the first of Louis XIV's adventures into warfare as a national policy. It centered about a revival of Marie Therese's claims to the Spanish succession that she had relinquished in the Treaty of the Pyrenees in 1659 before her marriage to Louis in 1660. By 1666 her father, Philip IV of Spain was dead, and Louis was willing to consider abrogation of the Treaty of the Pyrenees. In November 1666 Patin was writing that "They are working on a book about the rights of the Queen to the territory of Brabant and the county of Hainault; it will be printed in latin and french."[12] In February he wrote that "they are talking here of a grand review of 50,000 men that the King plans to hold next month in the Champagne; could they not move from there into Flanders or Germany?"[13] By May the advance into Flanders had begun; by the end of August Lille was besieged.[14]

On the 26th of August Patin wrote to Falconet that "The King wishes to organize his army more efficiently than it has ever been done before, and knowing that a great number of soldiers, and even officers, die for lack of proper care, he has sent for three skilled surgeons of this city, Messrs. Turbière, Gayant, and Brinaise, who are very experienced in the treatment of wounds."[15] Not for the last time would the imperative demands of war take the investigator from his laboratory.

OBSERVATIONS ON THE TRANSFUSION OF BLOOD FROM ONE ANIMAL TO ANOTHER

(Perrault's Introduction of 1688)

NOTICE

Although there has been no mention for a long time of the transfusion of blood about which there was so much ado twenty years ago, and although this operation, which was believed to promise the cure for so many illnesses, was destroyed by itself more than by information given to the public when it was at the height of its popularity, we could nevertheless not neglect to inform the inquisitive of certain circumstances pertaining to this matter known only to a few persons. This we do with all the more reason since it appears that minds will be better disposed to judge of what should be believed about it having been relieved of the prejudice which the promise of a thing apparently so useful had so strongly established.

12 Patin, Gui. *Lettres.* J. H. Reveillé-Parise, Ed. Paris, Baillière, 1846. 3 vols. Vol. 3, p. 631.
13 *Ibid.*, p. 635.
14 *Ibid.*, pp. 646-660.
15 *Ibid.*, p. 662.

The following experiments were made some time before those which a certain person made in Paris with an éclat and in a spirit entirely opposite to the conduct of the investigators who carried out the ones reported here, and who believed they could not conclude anything so quickly, foreseeing the danger inherent in approving or rejecting with temerity a matter of this importance. They did even wish to take sides, though solicited to make a declaration in the disputes which broke out on this subject and which led to a criminal trial concerned with a man who died after transfusion was carried out on him. The wife of the deceased had accused him who made the transfusion of having killed her husband, the friends of the operator saying that the wife had poisoned him at the instigation of the physicians, who feared that the use of a remedy so sovereign would lead to the neglect of all the other remedies they had been accustomed to use.

This calumny was received with great applause by the Public, which naturally has an aversion to those who practise the profession of medicine, as great as its love for those who give remedies without being physicians, through a weakness to which most people exempt from all others do not cease to be subject, as if, because nearly everyone dies in the hands of orthodox physicians and while using their remedies, it is a matter only of avoiding[16] these murdering hands. Thus this nation was eager for human blood to save its life, believing itself safe as long as the treatment was with new and unknown remedies, which is the same as to believe that there is less danger in a vessel steered by the first comer, who knows nothing of the sea, because ships commanded by pilots are often wrecked.

It must nevertheless be avowed that this example of the failure of the salutory advice, which was so badly received, that the physicians had chosen to give so as to undeceive about transfusion was not the only reason why those who made the experiments reported here did not publish at the time the judgment they had formed of this operation. The truth is that all were not of the same mind, and there were many who found themselves enough prejudiced by the authority of the foreigners who had approved of transfusion, not to wish to defer to the opinions of the others, and for the reason that there might be doubt of the accuracy with which the experiments had been made, upon which were founded conclu-

[16] This word is illegible in the original text, and this reconstruction is suggested to give plausible meaning to the sentence.

sions to the disadvantage of this operation. Nevertheless, the way things happened is described here in enough detail to indicate that the experiments were made with precision and by methods capable of giving a sure understanding of what was done, which was not at all practised in the experiments carried out in foreign countries and in Paris, where, from the way they were carried out, it was impossible to be certain how much blood passed from one animal to the other, or even if any passed. The glass cannulae which were said to be used were not adequate to yield this information, for the reason that it is not possible to notice whether a liquid traverses a cannula, or whether it remains there without movement because it has clotted, even though the cannula is transparent.

The knowledge we had of the quantity of blood the animals gave and what they received, being as certain and exact as it was, and moreover being joined to the observations made of all that followed the smallest or the largest loss of blood in some of the animals, and of its reception in the others, ought obviously to render the judgment made here of this experiment better founded than if one had considered only what had happened to animals whose veins and arteries were opened, and to which cannulae were attached, with the purpose of making blood pass from the body of one into that of another. This is so also if it had been concluded that an animal can receive the blood of another without being inconvenienced thereby, because the one intended as the recipient did not seem to be harmed, or if instead of judging that those that found themselves languishing, or died after the operation, suffered these accidents because of the repugnance and impossibility that Nature finds in accommodating herself to an alien blood, it was believed that this happened because not enough blood was received, which the partisans of transfusion believe to have the virtue of giving new powers and vigor to bodies depressed by age or by illness.

These observations are presented with the reflections joined to them such as they were at the time they were made. This is why one will find there things that are not at all to the present taste, and, also, as they were made before the experiments which were published in Paris, nothing was put in of many things that these later experiments could provide in confirmation of what was said in this account, regarding the false conclusions that are often drawn from experiments. For there is room to doubt that all which

has followed these operations ought necessarily to be attributed to them as has been done, and that a disease such as that of the man on whom transfusion was performed, which was persistent insanity, could be cured by taking out his blood and substituting another for it, however good it might have been. Indeed if good or bad blood is what confers or takes away the wits and good sense, the blood of a calf which the man was made to receive in the first transfusion ought to have communicated to him the stupidity of this animal. Finally, the death that followed another transfusion made later ought not to have led to the belief that in this operation there was received blood which was contrary to him, any more than the good condition in which he was after the first was a sign that he had not received any blood at all. Indeed, he may well have been relieved by what was withdrawn before the transfusion, since bleeding is a remedy which the experience of two thousand years has demonstrated to be capable of producing the greatest effects that can be expected in medicine while the experience with transfusion has taken no more than two years to show us that it is not at all a remedy, but an operation that can produce nothing but pernicious accidents.

Observations on The Transfusion of Blood From One Animal to Another

(The Académie Manuscript, 1667)

On the 22nd of January 1667 the first experiment was performed (in the Library of the King) on the transfusion of blood from the crural artery of one dog into the crural vein of another. The operation was carried out in the manner explained in Figure 1. It could not be determined, however, that any blood had passed, because the cannulae employed were not made exactly as described to the artisan, and for this reason the observations that had been proposed could not be made.

The 24th. The second experiment was made (at M. Gayant's) with other cannulae, appropriate for the operation, and yielded two observations. The first was that transfusion having been made from the carotid of one of the dogs into the jugular of the other, the blood passed therein with such impetuosity that the vein was noticed by one of those present to have the same pulsations as the artery. The other observation was that the dog, into whose vein the arterial blood of the other was transfused, died immediately,

and the right ventricle of the heart and the superior vena cava were found filled with quantities of clotted blood.

The 26th. The operation for transfusion was resumed (at the Library of the King). The blood having passed with less violence and in too small a quantity to be clotted instantly, the dog receiving it did not die, but having been untied, appeared very morose and feeble in comparison with the other which had lost much arterial blood by mischance, and on which later on there had been made other operations quite capable of distressing it, such as to ligate its trachea until it appeared to be suffocated for some time, and then to open the aforesaid trachea by an incision between the annular cartilages; nevertheless, and notwithstanding all that, it is still living.

The 28th. (At M. Gayant's) After the transfusion the same observation was made in regard to the weakening of the animal that received the foreign blood, and the coagulation in the recipient vein was manifestly recognized. On pressing it with the finger it was felt at first to be much inflated, and this swelling being reduced and separated in two by the compression, it did not return at all to its original swelling for lack of fluidity of the blood.

The 3rd of March, (at M. Gayant's) the coagulation of blood received into the vein gave rise to the same difficulties, and as usual, the different effects the transfusion produced in the two animals were noted [that which had received the blood remaining feeble and depressed, and the other not seeming to be at all enfeebled].

On the 15th, the transfusion was made for the sixth time (at M. Gayant's), after which the dog that received the blood seemed a little less feeble than usual, from which it was judged that it had received but little.

Finally on the 21st, (at M. Gayant's) the seventh and last experiment was made with an infallible precaution to be assured of the quantity of blood that the animals gave and received. This was, that after having withdrawn three ounces of blood from the one that was to be the recipient, each of them was placed on one of the sides of a balance, along with the boards on which they were separately attached, with their cannulae tied and all ready to be joined one to the other, and thereupon the balance was equalized by the addition of weights where it was necessary to bring them into equilibrium. Then the dogs were placed with their boards on

the table, and having joined the cannulae, the transfusion was made. This was known to be of two ounces of blood, since, having replaced the dogs, each on its side of the balance, the recipient was found to weigh four more ounces than that which had given blood. Following this, the transfusion was resumed for a second time, during which three ounces of blood were again removed from the recipient, which being placed immediately upon the balance with its companion, was found, as at the first time, to weigh four ounces more than it did. This indicated that it had received in this second transfusion three and a half ounces, since to equalize the three ounces which had been removed, it must be supposed that it had received one and a half ounces, and to produce the four that it weighed in excess of the other, it is necessary that it received two, which with the two of the first transfusion, and the one and a half for equality, made the number of five and a half ounces of arterial blood which one of the dogs had received, and a similar amount which the other had given, and six ounces of venous blood which had been withdrawn from the recipient [which did not die until the day after the transfusion].

All these observations, although confirmed one by the other, have still left some question that there may be defects in the operation, and whether the precaution that was taken to bleed the recipient animal was indeed capable of preventing in some manner the too sudden influx of blood from stifling it. But one cannot be assured by this means that one does not withdraw more or less than it receives. That is why a means was proposed to balance with certitude in one and the other animal the quantity of blood which is received with that given, which is to make use of a double cannula, the structure of which is explained in the second figure.

This transfusion by a double cannula, which in truth cannot be employed except on large animals because of the size required for the incision of the vessels so that they can receive the two ends of the cannulae, is surely infallible for the purpose of making the transfusion mutual, and in consequence more supportable by the animals, which, reciprocally giving and receiving, will not be at all subject to a sudden change, which is in general always a burden to Nature, if not completely insupportable. By this means, the circulation of all blood taking place as it does in a short time, the blood of the two dogs, mixing and uniting, will thus be rendered less foreign to the one and the other of the animals.

Waiting for this experiment to be carried out, or for other experiments to reveal more visibly the good or the bad effects of transfusion, supposing only that it be supportable, and that there is no more reason to believe that the animal one fills with a foreign blood should die than the one from which it is taken, several reasons were proposed, as much for one as for the other of these opinions.

At first it was said that it would be a great relief to an enfeebled and exhausted Nature to be relieved by the means of a transfusion from the work of the first concoction of the aliments, so that the spirits and the heat which are consumed in it could be employed in other functions important to life, and that there would be a considerable advantage to be able to substitute for a poorly conditioned blood, one more fully and better elaborated. Finally, there is much evidence that Nature, who always aspires to perfection, would gladly accept a succor so honorable, since one knows that she has been accustomed to make use of it in the grafts of trees,[17] which succeed very well when they are made from the cultivated upon the wild, and that this artifice has no less success in the bodies of animals, when for the repair of a mutilated part one joins to it another living part with which, it is asserted, it unites easily enough.

These arguments, nevertheless, when they were examined, could not support the belief that there was much foundation to the hopes that had been conceived for such a substitution of blood, and the method that Medea employed to rejuvenate her father-in-law has seemed less fabulous and more probable, since this judicious operator did not claim to renew the blood of Jason (*sic*) solely by infusing medicinal fluids into his veins from which she had withdrawn the old blood, but she made the principal part of her cure consist in the virtue of a remedy which she made him take by mouth.

17 In "The method observed in transfusing the blood out of one animal into another," published in No. 20 of the *Phil. Trans.* on 17 December 1666, Richard Lower wrote: "It seems not irrational to guess aforehand, that the exchange of blood will not alter the nature or disposition of the Animals upon which it shall be practised; though it may be thought worthwhile for satisfaction and certainty, to determine that point by Experiments. The case of exchanging the blood of Animals seems not unlike that of *Graffing*, where the *Cyons* turns the Sap of the Stock, graffed upon, into its nature; the fibres of the *Cyons* so straining the juice, which passes from the stem to it, as thereby to change it into that of the *Cyons*, whereas in this transfusion there seems to be no such Percolation of the blood of Animals, whereby that of the one should be changed into the nature of the other" (see note 3, pp. 357-358).

veterem namque exira cruorem
Passa, replet sucis; quos postquam combibit Aeson
Aut ore acceptos aut vulnere.[18]

The analogy of the study of trees cannot be accepted to prove anything in this matter, even though the conclusion that one could draw from it is reasonable enough, it being apparent that if a living object accepts union with a foreign part, the nutrient fluid will for even better reasons endure the mixture and accommodate a foreign fluid. But if one considers the great difference that there is between the nutrition of animals and of plants, it is not at all apparent that the general vegetative processes, which are the only thing they have in common, could support a conclusion on the processes of vegetation which are peculiar to the one and the other, any more than the animal intelligence which is common to all animals indicates that there is an equal intelligence in the man and the horse. It is a rule that Nature does not at all devote that care and that exactitude to plants that she employs for animals, in the actions of which she follows always the same plan, because that which is made the best cannot be made except in a unique way which is the best, and this is not required in the less perfect nutrition which suffices for plants. In these it is seen that the root, which serves for mouth and stomach, or even for the heart, is not at all a

[18] The rejuvenation of Aeson, father of Jason, by his daughter-in-law Medea is recounted in the seventh book of *The metamorphoses of Ovid*. Praying first to Hecate, Medea outlined the "Need of essences by which an old man may be restored to the flower of his youth, and regain the prime of life." Then in a chariot drawn by two winged dragons, she set out to gather the ingredients for her rejuvenating potion. These collected, she made the potion and administered it, slitting the old man's throat, letting his aged blood drain out and refilling his veins with her potion. "Aeson absorbed it, both by mouth and through the wound she had made. Quickly his beard and his hair lost their whiteness, and turned dark once more. The shrivelled, neglected look of old age was dispelled and vanished, his pallor disappeared. New flesh filled out his sagging wrinkles, and his limbs grew young and strong. The old king marvelled at the change in himself, recalling that this was the Aeson of forty years ago." (*The metamorphoses of Ovid*, Mary M. Innes, Tr. London, Penguin Books, 1955, pp. 174-176.)

No less fabulous are later reconstructions of supposed transfusions. Simonde de Sismonde is responsible for a notable one in his *Histoire des Republiques Italiennes du Moyen Age* (4th ed., Brussels, Wahlen, 1826, vol. 8, pp. 248-249): "In his final illness, the Pope Innocent VIII let himself be persuaded by a Jewish physician to try the remedy of the transfusion of blood, often proposed by charlatans, but which had never been tried except on animals. Three young boys, aged 10, were successively, by means of a recompense given to their parents, submitted to the apparatus which transfused the blood from their veins into those of the old man, and replaced it by his. All three died as soon as the operation was begun, probably by the introduction of air bubbles in their veins, and the Jewish physician took flight rather than make the attempt on new victims. No result was obtained, and the Pope died on 25 April 1492."

An account of this episode that could not have been influenced by the actual history of transfusion, as is likely in the above, is in Annales ecclesiastica ab anno 1598 ubi desinit cardinalis Baronius, auctore Odorico Raynaldo. Vol. II, Lucae, Venturini, 1754, p. 197 which has it that the Pope was treated with a preparation of blood "chimica arte paratum," with no mention of how it was administered.

part whose structure and character require something so exquisite and particular that its action can not be replaced by another part, for it is seen that the bark of the trunk and the branches accomplish this, when, being moistened with dew, they nourish it. The plant similarly produces and sprouts roots, if the occasion presents itself by the application of earth, as is seen to occur if one fastens a branch in a vessel filled with it.

It is not the same with the nourishment of animals, which is a process so perfect that if there be lacking the least thing which Nature is accustomed to employ in it, the work is not at all completed, to such an extent that the defects of the first concoction cannot be repaired by the second. Just as the superior construction of a palace cannot be effected except from materials cut and appropriate to its particular structure, contrary to the huts which are built from stones as they are found in the quarry, or even from the demolition of another hut, so the parts of each animal cannot be nourished except by blood which has been prepared by these very parts, and the flesh of a dog cannot be nourished and repaired by the blood of a fox, nor even the flesh of one dog by the blood of another dog, any more than the stone which is cut for an arch can serve either for the construction of a wall or even for another arch than that for which it was cut. Thus this comparison leads to the concept that the assistance that can be given to Nature by the infusion of a foreign blood, however pure and well elaborated it might be, is comparable to the assistance that an architect might receive, when, prevented from quarrying the stones with which he wishes to construct a perpendicular wall, he is brought those perfectly well cut for making a slanted wall.

Herein lies the whole of the economy by which the admirable work of the life of animals is conducted, that is, that nothing is lacking in the mutual interaction existing among the different parts, which all combine into a certain character particular to each individual, and common to all the parts composing it, which makes it possible that what one has begun can be completed by another. Thus it is easy for the heart to impress upon the chyle the form of blood which it has to impress upon it, because this chyle was dis-

---

Fig. 1. The table A,A, is to support the two boards D,D,C, and D,D,B, which are pierced with several holes for passing cords to tie down the dogs as close as possible to one of the sides of the boards for the purpose of tying the dogs as close to one another as is necessary.

La table A,A sert pour soustenir les deux
ais D,D,C, et D,D,B. qui sont percez de plusieurs
trous ou l'on passe des cordes pour y lier les
Liens le plus prest qu'il se peut de la teste des bords
de l'aix afin d'approcher et tirer les cheuz proche
l'un de l'autre selon qu'il est besoin.

L'artere crurale G.H. estant descouuerte, & liee de haut et en bas, & puis ouuerte selon la longueur au milieu des ligatures on y introduict le syphon G, iusques a ce que la tunique de dessous, comme la petite membranelle circulaire marquee I, paroisse a l'orifice, qui se fait dessus.

On lie par la mesme methode a la veine crurale E F de l'autre cuisse le syphon L. Cequi se fait en chacune cuisse separement sur son axe, que l'on approche ensuitte l'un de l'autre pour ioindre et emboiter les syphons l'un dans l'autre: apres quoy on oste la ligature, qui auroit empesché le sang de couler par la teste vers le cocur et ensuitte celle de l'artere, qui empeschoit l'air dans le syphon.

La transfusion dans la Jugulaire, dans la Carotide ou dans la teste crurale se fait par la mesme methode, en changant seulement la situation des cuisses, a cause la difference et la mobilité des ais sur ces quels ils sont attachez rend assez facile.

M.N, K, & L sont les doubles syphons par le moyen desquels le sang d'vn animal passe dans vn autre, de telle sorte, que l'vn ne tire et ne prend dauantage, qu'il en donne par vne partie artere O,P, enuoye par la partie O, du sang dans les syphons M & N, & ensuitte dans la teste QR par la partie Q, & mesme temps la partie R de la teste enuoye du sang par les syphons E, L, & R, dans l'artere O,P. par la partie P.

Pour mieux conclure icy il se faut souuenir, que le mouuement naturel du sang dans l'artere est de O, vers P. & que celuy de la teste est de R a Q.

posed to it by other parts which have, so to speak, similar operating principles, and make use of the same instruments. On the contrary the blood that has been prepared by the heart of one animal is poorly adapted to nourish the flesh of another, which having different heat and spirits, would find these arrangements different from those it requires.

[One might say that it is for this reason that Nature has taken such precautions in the structure of the umbilical vessels and those of the placenta, destined for the preparation of the nutrition of animals while they are in the belly of their mother, in which there is carried out a sort of transfusion of the blood of the mother into the body of the fetus. For although the blood of the mother has a great resemblance to that of the fetus, nevertheless it does not at all pass directly from the vessels of the mother into those of the fetus, because it is in reality a foreign blood, and because in this state it cannot be admitted until it is, as it were, naturalized in the placenta, which, being a structure common to the mother and to the fetus, is capable as part of the mother of receiving her blood, and as part of the fetus, of sending to it the blood it contains, just as other parts carry to the heart the blood they contain, or as even the stomach, the intestines and the lacteal vessels communicate to it the nutrients they have prepared for this purpose.

Fig. 2. The crural artery G,H is exposed and ligated above and below and then opened lengthwise between the ligatures; the cannula G is inserted until the tunic of the vessels covers the small circular ridge marked S to secure the ligature made above.

In the same manner the cannula I is tied in the crural vein E,F, of the other dog. This is done separately on each dog on its board, which is brought together with the other to join and insert the cannulae one in the other. After that the ligature is removed that had kept the blood from flowing in the vein toward the heart, and then that of the artery that had kept it from entering the cannula I.

Transfusion via the jugular, the carotid, or the crural vein is carried out in the same manner, changing only the position of the dogs, which the arrangement and the mobility of the boards on which they are tied makes easy enough.

M,N,K and L are the double cannulae by means of which the blood of an animal passes into another in such a way that the one does not receive more than it gives, because the artery O,P sends blood by the part O into the cannulae M and N and then in the vein Q,R by the part Q, at the same time that the part R of the vein sends blood by the cannulae E,L, and R into the artery O,P, by its part P. To understand this better, it is necessary to remember that the natural movement of blood in the artery is from O toward P and that that of the vein is from R to Q.

It should be noted, moreover, that is is probable that the membranes, the glands, and the vessels of the placenta have a particular property of preparing and rectifying the blood that is contained therein, which does not take place in other veins, where the alien blood, mixed with the proper and natural blood, clots and corrupts. These parts of the placenta are disposed to suffer without damage the mixture of blood that comes there from the spermatic and hypogastric arteries of the mother, with that which comes from the umbilical vessels of the fetus, and they aid the accomplishment of the alteration which the blood of the mother receives by this mixing, which by a sort of fermentation is changed in some way into its own kind.

If the blood of the mother is not similar enough to the blood of the fetus to be directly transmitted to it, and if the vessels of the fetus, which are naturally joined to the body of the mother, have need of other vessels that alter this blood and make it similar to that which is proper and natural for the fetus, how likely is it that the blood of an animal of a different species, could be received into veins capable of rectifying and altering it in a moment, and preventing it from spoiling and corrupting the natural blood they contain?]

(For the same reason, those who maintain that the preparation made of the particles of which all things are composed consists in the different configuration of their matter, whereby they acquire a certain shape making them capable of uniting and penetrating certain passages more than others, can easily conceive how it is impossible for the proportions necessary for these combinations and preparations to be encountered except by extreme chance between the configuration and the conduits of the parts of one animal and the blood of another.) This, one can be certain, was never encountered in any of our experiments in which the blood was always clotted in the vein where it was received. This coagulation appears thus as a certain sign of the incompatibility encountered between the material received and the part receiving it, which was not the true locale but only the vessel containing this transmitted material. The difference existing between the container and the proper locale is an argument established by the philosophers who propose that the proper locale has not only the virtue of containing but also of preserving and even of perfecting that which it contains. This one ought to believe the veins and the

arteries to possess, as much by their own properties as by an irradiation from the principal parts from which they arise, which renders them capable of preserving that which these have produced, but which apparently does not act at all on foreign fluids, which they only retain, without causing there any other alteration or corruption, so that one might say that the force and the heat that these places have for the preservation of their own humors become a cause of the corruption of foreign ones. According to the opinion of philosophers who have reasoned best on the causes of spoilage, this sensitivity of the blood to become corrupt is so great that it occurs not only when it is extravasated, but also in its own proper locale, if this place happens to suffer some alteration in its natural constitution. This is seen in varices in which the blood clots and corrupts simply by the dilatation of the vein, which proceeds often only from some external cause. But even though one might have reflected so little on the material of the humors and the parts that ought to receive them and preserve them as to believe that this reception of a foreign blood could be made without its corruption, the sole fact of the violence and the suddenness of the change and of the movement of the humors and the spirits that this transfusion necessarily entails is more than sufficient to make one conclude that it is impossible for it to be supportable. Nature is so jealous, so to speak, of the conduct and the supervision she exerts over the movements and on the alteration of the humors that she cannot endure anyone to undertake anything of importance without her, which changes the order she has been accustomed to give to those actions which the heart by its beat and generally all the parts according to their character have the command to execute. This truth is seen manifestly enough in the effects of passions to take away life, whose violence consists in nothing but in the perversion of the natural movement and of this ordinary alteration in the humors. Indeed it is established that the cause of disease is not to be explained better than by this perversion, it being reasonable that disease and death proceed from the disorder of things which by their order encompass life and health.

These considerations have rendered a little suspect the truth of accounts that have been sent out from England and elsewhere concerning the real success of transfusion. Even more to the point are those experiments that we have made to the contrary of what they contain, since those of our animals which did not die have almost

always been more feeble, more unhappy, and more depressed than those from which blood was taken. Nor can one believe that our experiments succeeded poorly by reason of some particular defect in the operations and subjects, which thus were poorly disposed to support whatever was defective and capable of enfeebling in them. [For there is no reason to say that the coagulation that occurs in blood in a transfusion could come from the cold of the air which, acting on the cannulae, causes an alteration which could be prevented if the cannulae had been wrapped in warm cloths; nor any probability that the passage of blood in the cannulae, being as prompt as it is when it does not clot, could give occasion for this impression of cold and other coagulative qualities of the air, which are things that do not at all produce their effect in such a short time.]

Nevertheless one has to agree that if one can convince himself that in a quarter of an hour an animal can lose its blood, for that which one gives it is not its own, without even being weakened, as we are told, then one might believe that blood is of very small importance for life. In fact, then, our blood is not ours in any way other than is our shirt, and even somewhat less ours, since there are circumstances in which we cannot dispense with it without exposing ourselves to a greater peril than there is in changing our blood, if one believes the observations and the experiments which are said to have been made.

That is why it is judged that everyone who has difficulty in believing in metempsycosis, transplantation of teeth, ears and noses, as has been carried out in Italy, according to what is said, will doubt the ease of this exchange of blood. Thus he will persuade himself the more easily that that animal, which, so it is said, after the operation of transfusion had only to shake its ear to relieve itself of the burden of being tied for half an hour upside down on a table, had suffered nothing at all, in fact, other than the loss of the blood withdrawn from it which may well have been in excess. It probably received but a very little of the foreign blood because of the coagulation which took place without delay in the cannulae or in its veins, it being very difficult if not impossible, according to the modus operandi of the observers from whom we have the account, to estimate the quantity of blood which passed from one animal into another, except by the suffocation of the recipient as has happened in some of our operations. The others

[transfusions] which the animals withstood could not support any other hypothesis except that the small quantity of blood which passed, having mixed with the mass of the animal's own natural blood, had not enough force to incommode it.

It is not necessary to say that it was changed into the nature of the blood of this animal as one says that a drop of water is changed to wine when it is mixed with that which fills a large vessel, since there is nothing more false or more distant from true philosophy than to believe that one thing changes into another by means other than those Nature has been accustomed to use in her changes. All these metamorphoses, as of wheat into crabgrass, of the spinal cord into a serpent, of lead into gold, and of man into frog, are equally fabulous, one and the other. That is why it is reasonable to conclude that as water does not naturally change itself into wine, otherwise than by altering itself and perfecting itself in the vine, so foreign blood never will become proper and natural for an animal, unless, being converted into chyle in the stomach, it then be altered, concocted, and perfected in the organs to which Nature has given the power of impressing upon the chyle the true character of blood. For even though one might be persuaded of the truth of certain conduits that are claimed to have been found to carry from the oesophagus into the thoracic ducts and from there into the veins a part of what is drunk, one is not obliged at all to avow that blood is made immediately from this liquor, without it being first converted into chyle, since one might say that this liquor never becomes blood, and that it serves only to dilute it, as does the lymph, or, that it has received in the mouth, which acts on aliments as does the stomach, an impression which equivalent to chylification, has prepared it to receive the final character of blood in the heart and in the liver. For, however feeble and light this preparation might be, it is nevertheless more adequate to permit this liquid to receive in the blood-forming organs the completion required for the parts to be nourished, than is the actual form of a foreign blood, which instead of a compatible disposition carries a repugnance to this completion all the greater as the blood is more perfectly completed and more proper for nourishing the animal for which it was prepared. It is for this reason that one can easily understand that the nutriment on which the natural heat has labored long and effectively to give it the final disposition for nourishing a bone is less proper for nourishing the eye than if it

had still only the more general and less specific dispositions. So one knows by experience that milk, which is properly nothing but chyle, that is to say imperfect blood, is a better aliment to receive in the stomach than perfect and finished blood.

Finally, to reply to another example which might be given to insinuate the utility that a foreign blood might provide, it is not necessary to refute the opinion of those who believe that a bath in blood of infants cures leprosy. One cannot doubt that the veins, carrying to the depths of the body whatever enters by the pores of the skin and is mixed with the blood which is there, might not communicate to the interior anything beneficial or harmful which touches the exterior surfaces. Nevertheless, one cannot infer from this that this blood serves any other purpose than to foment by the gentleness of its heat and its humidity the parts that are affected by contrary qualities, far from concluding that its entire substance passes inside to restore the parts there.

It is considered that these experiments are not sufficient to prove that transfusion is something objectionable and pernicious. One can say with equal correctness that the experiments made up to the present on this subject do not at all prove the contrary, since they cannot demonstrate that an animal lives when deprived of its own blood, but only that one might be encountered vigorous enough to support in its veins a mixture of blood not its own. So it might support muddy water or some other foreign substance with the same facility we have experienced, just as it has been reported that some can endure being strangled and then having their throat cut without dying thereby. Otherwise, following the analogy of the conclusions drawn from the facility some animals have had to support the transfusion of a little blood to prove that the exchange of blood is not at all insupportable per se, one could quite wrongly conclude that to be strangled and then to have the throat cut is nothing especially harmful because experience has demonstrated that an animal has survived it. This is why, just as this particular strength that is encountered in one animal prevents one from being able to affirm that the harm one does it is light, by the fact that it has easily endured it, similarly the feebleness that might be met in another does not permit it to be inferred that the harm done to it is great because it was unbearable. All the same, to conclude, as do the observers in England, that an animal has lost all its blood because a great deal has been withdrawn from it,

and that another has given it all its own because it has died in giving it, it would be necessary to establish that the one is feeble enough to be unable to lose much blood without succumbing, or without receiving it from another, and that the other is strong enough that it cannot die until having given up to the last drop of its blood. This cannot be proven by any experiment, there being no rule for knowing certainly and precisely just how far the strength of an animal can extend, and the quantity of blood that it has, since some might be found that are powerful in action and not in resisting. Also, quite often, what is taken for indications of an abundance of blood arise only from a particular disposition of this humor, which can deceive in producing by its quality those effects which are attributed to quantity.

[The last thing there is to add is that it is well known that to all these arguments it can be replied that if there is some danger in transfusion, it is only in doing it improperly, against which it is easy to take precautions. It is true that blood, even the best conditioned and the best adapted to repair the strength and renew lost vigor, can cause suffocation if it is permitted to enter the veins and the heart with too much impetuosity, just as the best food becomes mortal if it is taken in too great abundance. Indeed, those who have most need of it are those who stifle the most promptly, as happens to persons who have undergone a long fast. Finally there is nothing so good or so useful in itself that cannot become pernicious by improper use. But as this answer is not difficult to foresee, it must be presumed that it is not possible that there has been reflection on all those facts reported above, without examining them in this regard. This being so, it is evident that transfusion has inevitable inconveniences, which do not at all depend upon the manner in which the operation is made, and which are not less important than the suffocation caused by the poorly regulated movement of the blood that is given. Thus the languor which appears in the animals that have received but little of this alien blood, being strong enough to resist whatever harmfulness it has, cannot be attributed to a faulty manner of making the transfusion, any more than the coagulation, which the blood does not at all undergo when it is agitated by a sudden movement. Thus one cannot doubt that, coagulation being one of the worst things that take place in blood, transfusion cannot avoid one of two difficulties which arise when blood flows either with an impetuosity that

stifles the animal, or with a slowness that causes a coagulation that corrupts it without fail, as happened in the last experiment where the dog that received five ounces and a half of blood did not die until the next day. This death, which cannot be attributed to a too sudden movement of blood, can only have been caused by the evil properties the blood acquired from the corruption it underwent when it clotted, or simply from the repugnance and the impossibility of Nature to accommodate a foreign blood.]

This is ample demonstration that there is hardly less vanity in these experiments than in the reasoning, although it is a matter of tangible things, and that it is as easy to be thrown off by false experiments as by false reasoning. Finally one cannot be assured that these two excellent instruments of the most perfect intelligence are exempt from error, except by correcting them one by the other, which demands an exactitude and an application greater, to my mind, than that which has been employed by those who have no doubt at all of the advantages which the transfusion of blood from one animal to another can bring.

The Different Careers of Gustav Fritsch (1838-1927)*

HARRY GRUNDFEST**

Two works published independently and almost simultaneously in 1870 had a particularly important bearing on neurology and neurophysiology. Hughlings Jackson reported in that year[27] his conclusion, based on clinical evidence, that an area of the brain must exist which is not only associated with motor activity, but which furthermore must be so organized topographically as to account for patterns of motor involvement in certain regularly spreading epileptic seizures. In the same year Gustav Theodor Fritsch and Eduard Hitzig[24] published their experimental demonstration that contrary to Flourens' doctrine there is an area in the cerebral cortex which may be excited electrically to produce movements both discrete and complex, resembling in their patterns those that are now known as Jacksonian epilepsy.

Occurring as it did in the early days of modern neurophysiology, this remarkable concordance between clinical and experimental findings had a far-reaching influence. Thenceforth, the study and analysis of central nervous activity could the more easily disregard mystical notions of soul or spirit and concentrate on mechanisms based on a physical substrate. Neuroanatomy and neurophysiology were thereby urged on, and neurology itself at this early date became one of the more scientifically oriented of the clinical disciplines.

Fritsch worked in a number of fields during a life span of almost 90 years. He was a traveller and explorer in South Africa

* This note is contributed in memory of Professor John F. Fulton, whose love for the history of science was but one facet of a warm-hearted, cultured, and gifted scientist. A query from the late Professor Fulton, whether the "electric fish" Fritsch was the same as the Gustav Fritsch of the "Fritsch and Hitzig experiment" uncovered an historical error. The three current editions of English-language histories of medicine[4, 25, 31] unanimously list the Fritsch of the "experiment" as having lived between 1838 and 1897. None identifies him with the "electric fish" Fritsch, although this was in reality one and the same man, who lived until 1927. This article was started at Fulton's urging, but its writing was discontinued when Walker[34] published a photograph of the "experiment" Fritsch giving the correct dates in the caption. My attention was recently called, however, to two widely disseminated surveys of the history of physiology[3, 30] both of which give a still earlier date of Fritsch's demise—1891. It is particularly surprising that Dr. Brazier[3] should have published an erroneous date, since her careful scholarship is well known and since she reproduced Fritsch's photograph from Professor Walker's paper where the dates are right.

** Department of Neurology, College of Physicians and Surgeons, Columbia University, New York.

and participated in several astronomical expeditions. Prior to and after his excursion with Hitzig into the physiology of the mammalian brain, Fritsch published numerous papers on comparative anatomy. Under the inspiration of his great patron, Emil du Bois-Reymond, Fritsch systematically studied the anatomy of five of the seven known families of electric fishes and became one of the leading authorities of his day on electric organs. He published several books on physical anthropology and was a pioneer and a leading spirit in establishing scientific photography on a professional basis.

The esteem in which Fritsch was held by his contemporaries is evidenced by the first of a projected series of articles on "Neurologists and Neurological Laboratories," devoted entirely to "Professor Gustav Fritsch," that appeared in 1892 in the *Journal of Comparative Neurology*.[29] Although unsigned, it was undoubtedly written after a tour of Europe by the editor and founder of the journal, C. L. Herrick, brother of the late C. Judson Herrick.

Fritsch's various accomplishments were noted in Herrick's sketch. Nevertheless, none of the current historical sources connect Fritsch of the Fritsch and Hitzig experiment with his other work, or as the friend and associate of du Bois-Reymond, Virchow, and Waldeyer, all of whom he long outlived. Despite the fact that the historical accounts cited above[3, 4, 25, 30, 31] give the date of Fritsch's death as 1897 or 1891, the catalogue of the Library of Congress (and its replicas in indexes and catalogues of other libraries) give no date for his demise, implying that he is still alive.*

Gustav Fritsch was born on 5 March 1838 in Cottbus, the son of a minor government official of Prussia. His maternal grandfather was an important Silesian industrialist, Kranspa.** Fritsch's financial independence from this source, probably further in-

* I have not been able to track down the origin of the error in the historical sources, but it may be based on the following: The 1900 volume of the *Index Catalogue* of the U.S. Surgeon General's Office[33] lists Fritsch as having died in 1891. A fine-print item cites the 1892 sketch by Herrick.[29] It is therefore possible that the compiler of the *Index* assumed that the sketch was an obituary notice. However, Fritsch is also listed in the *Index* as co-editor, in 1896, of a journal on scientific photography. The historians who adopted 1897 therefore may have surmised that 1891 was a misprint for the later date.

A possible source of confusion is the listing of Fritsch as Gustav Theodor by the German biographical handbooks[2, 32] which, however, give the correct dates of his life span as do the *Encyclopedia Americana*[7] and a recent Germany history of medicine.[5] Fritsch himself apparently preferred to omit the Theodor, since it is absent from the title-pages of his major works. It was also omitted in the brief biographical articles that were written after Fritsch's death.[1, 6, 26, 28] Nevertheless, library catalogues usually list the full name. At one time the general catalogue of the Columbia University Libraries listed Fritsch as two apparently different persons, but the cards have since been combined, with a pencil line drawn through the middle name whenever it appears.

** The biographical data and some of the bibliography derive from the obituary articles by Benda, R. du Bois-Reymond, and especially that of Haller.[1, 6, 26]

creased by his marriage in 1871 to the daughter of a Breslau publisher, seems to have furnished, at least in part, his freedom to move about in a number of scientific fields. He determined at the age of nineteen to study physiology in Berlin under Johannes Müller, but since the latter died in the same year (1857), Fritsch first did his military service in a Guards regiment* and then turned to medicine. His doctoral thesis[8] was published in 1862 and he received his medical license the next year. He then promptly left for three years' stay in South Africa (1863-1866), carrying out anthropological and geographical studies at his own expense.

Returning to Prussia, Fritsch participated in the war of 1866 and then became assistant to Reichert in the Anatomical Institute at Berlin (1867). However, he left the next year as a member of the Prussian Solar Eclipse Expedition of 1868 to Aden. Probably it was his photographic skill that led to his participation in an astonomical expedition.** After the latter mission was completed, he took part in a trip archeologically guided through Egypt by Dümischen. At this time, as on other journeys to Egypt and the Orient, Fritsch photographed many things. One of those early records was of biological as well as of archaeological interest. It is the bas-relief (Fig. 2) on the grave of the Lord Ti of Memphis (*ca.* 3000 B.C.) which shows many species of Nile fishes, including the electric catfish, *Malapterurus,* one of the electric fishes which Fritsch studied later.

After his return to Berlin, Fritsch published his first book on South Africa,[9] his *Habilitationschrift,* as Dozent,[10] and his work with Hitzig.[24] The outbreak of the Franco-Prussian War interrupted this creative activity and led him again into military service. R. du Bois-Reymond[6] suggests that this interruption caused Fritsch to abandon further research in mammalian neurophysiology.*** At any rate, the next few years witnessed a return to his interests in anthropology[22] and microscopy.[23] Appointed an *ausserordentlicher Professor* of comparative anatomy in Reichert's department in 1874, Fritsch again took off on an astronomical expedition, this time on the Prussian Venus Expedition to Ispa-

* Service in the Guards was usually open only to the well born and is an indication of the affluence of Fritsch's family.

** R. du Bois-Reymond[6] says Fritsch was the leader of this expedition.

*** It is interesting, however, that Eduard Hitzig (1838-1907) also left physiology for clinical practice. He became Professor of Psychiatry at Zürich (1876-1879) and then at Halle (1879-1903). Hitzig's office desk pad is now in the possession of Prof. H. W. Magoun of the University of California in Los Angeles.

han. He prolonged that journey by a stay at Smyrna, during which he studied the comparative anatomy of the fish brain.[13]

The absences from Berlin were probably related to difficulties with Reichert, which eventually led to Fritsch's leaving the latter's department. Virchow then gave him working space at his Institute* until Emil du Bois-Reymond made room for him as the chief of the histology and photography sections of his own new Physiological Institute. Virchow, the elder du Bois-Reymond, and Waldeyer were his friends and supporters in the Berlin Akademie der Wissenschaften, and much of Fritsch's work from this period on was financed by the Academy.

Under du Bois-Reymond's influence, Fritsch turned to the study of the electric organs of fish, undertaking for this purpose several extended journeys to Africa. Reports which he sent back in letters to du Bois-Reymond were sometimes transmitted by his patron in brief summary to the Berlin Academy or published as letters annotated by the founder of electrophysiology.** Fritsch himself later published the detailed studies in a series of papers and monographs,[15,16,18,19] as well as a travel book on Africa.[17]

Working still at the Physiological Institute after another electrophysiologist, Engelmann, had succeeded du Bois-Reymond, Fritsch shifted his interest chiefly toward physical anthropology, here, too, utilizing his photographic skills. A book on the human body for anthropologists[20] was profusely illustrated. Published first in 1899, it campaigned vigorously for the beauty of the naked body against the prudery of his time, and it reached a second edition in 1905. Another book[21] was on the body structure of modern-day Egyptians. A study of the human retina also combined his various interests. Like many Europeans of means of the period, Fritsch held strongly that there were superior and inferior races of man, the Caucasians naturally being regarded as the highest representatives of mankind. In the pursuit of his thesis that there were racial differences in visual acuity he journeyed around the world in 1904, carrying out physiological tests and gathering specimens of retinas fixed within an hour of death. In 1908 he designated for the first time the *fovea centralis* and *area centralis,* discarding the older name of macula.

* The German word "Gastfreundschaft"[26] is a happy one!

** References 14 furnishes an example of this information. In the same volume of this journal, which was edited by du Bois-Reymond himself, are also published letters by Carl Sachs, sent from Venezuela where he was studying the electric eel, and by Babuchin, a Russian scientist who made frequent trips to Africa to study *Malapterurus* and other African electric fishes.

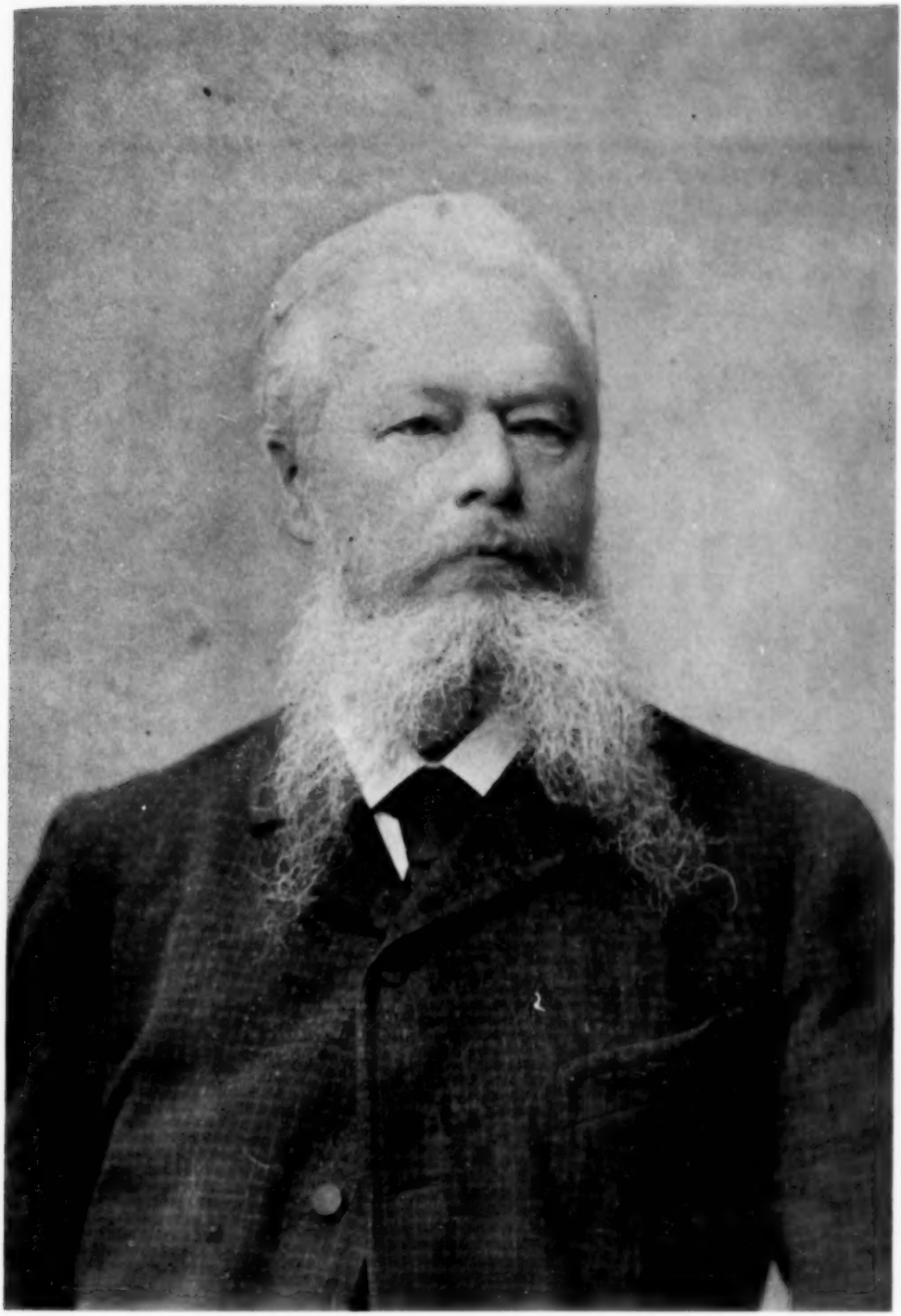


Fig.1. Portrait of Gustav Fritsch from a photograph in the Yale Historical Library. It is similar to one which appeared in Graf Haller's obituary[26] and later was published by Walker.[34]

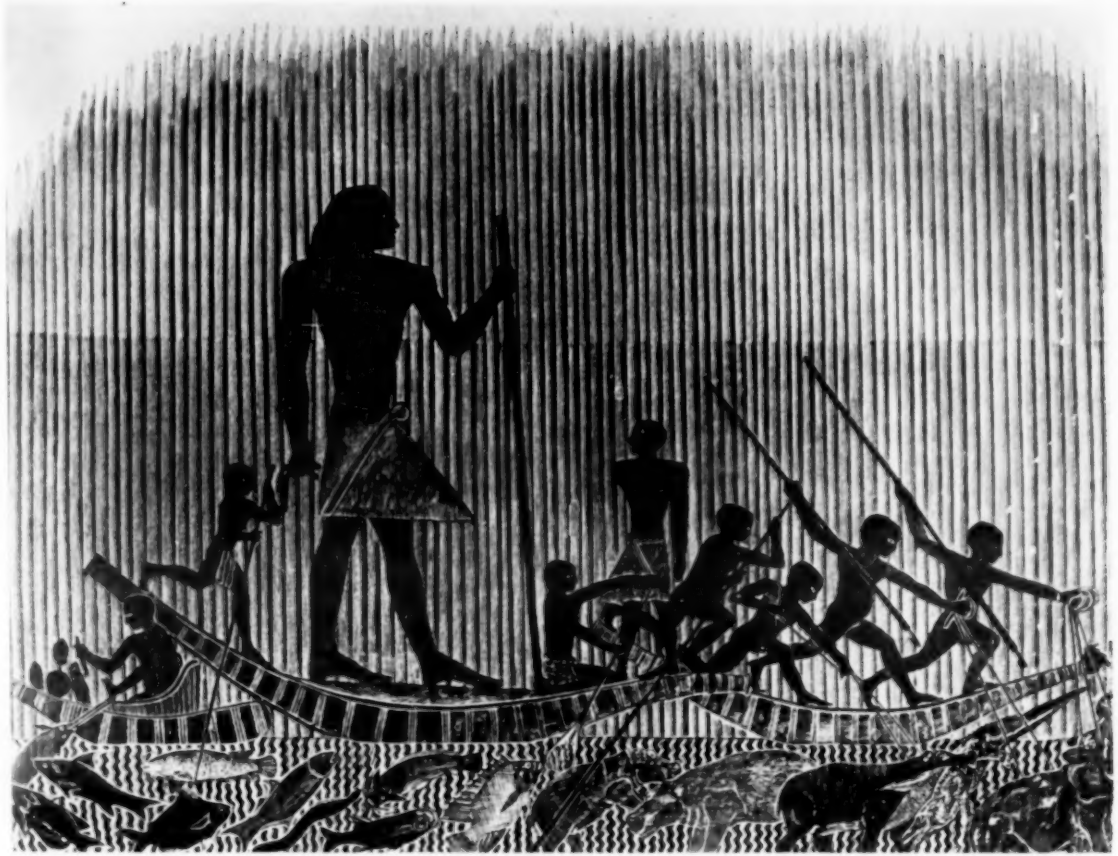


Fig. 2. A bas-relief in the tomb of the Lord Ti near Memphis. It was photographed by Fritsch in 1868 and was reproduced as a woodcut in his monograph on *Malapterurus*.[18] Ti, who was a court official about 3000 B.C., is shown as an imposing figure being punted through a papyrus thicket in the Nile. Nilotic fauna are represented below and include a clearly recognizable *Malapterurus electricus*, the Nile electric catfish. It is the lightly colored fish behind the pole of the rearmost boatman.

When Rubner succeeded Engelmann as Professor of Physiology at Berlin, the interests of the new head were foreign to Fritsch. Waldeyer, and later Fick, gave him space in the Anatomical Institute, where his career as a teacher ended in 1921. Fritsch's last extensive work was on the anthropological significance of head hair,[23] the material for which he had largely gathered on his 1904 world tour. It was another attempt to classify and order human races. Toward the end, his eyesight was impaired by a spray of chemicals, but he remained alert and of vigorously military bearing until his death on 12 June 1927 at the age of 89.

References

1. Benda, C. *Dtsch. med. Wschr.*, 1927, 53, 1273.
2. *Biographischer Lexikon des hervorragenden Aerzte*, 2d ed. Berlin-Wien, Urban and Schwarzenberg, 1930, vol. 2, p. 628.
3. Brazier, M. A. In: *Handbook of physiology, Section* 1, *Neurophysiology, Vol. 1*, Washington, D. C., American Physiological Society, 1959.
4. Castiglioni, A. *A history of medicine* (translated and edited by E. B. Krumbhaar), 2d ed. New York, Knopf, 1947.
5. Diepgen, P. *Geschichte der Medizin*. Berlin, de Gruyter, 1955, vol. 2, pt. 2, p. 76.
6. du Bois-Reymond, R. *Med. Klin.*, 1927, 23, 1047-1048.
7. *Encyclopedia Americana*. 1946 ed., vol. 12, p. 113.
8. Fritsch, G. *De medullae spinalis textura*. Berlin, 1862. (Cited by a number of sources.)
9. Fritsch, G. *Drei Jahre in Süd-Afrika*. Breslau, F. Hirt, 1868.
10. Fritsch, G. *Arch. Anat. Physiol.*, 1869, 654-758.
11. Fritsch, G. *Die Eingeborenen Süd-Afrika's*. Breslau, F. Hirt, 1872.
12. Fritsch, G. *Stereoskop. Sehen in Mikroskopen*. Berlin, 1873. (Cited by Haller.[26])
13. Fritsch, G. *Untersuchungen über der feineren Bau des Fischgehirns*. Berlin, Guttman'sche Buchhandlung (C. Ensler), 1878.
14. Fritsch, G. *Arch. Anat. Physiol. (Physiol. Abt.)*, 1882, 61-75, 387-413.
15. Fritsch, G. *Die elektrische Fischen im Lichte der Deszendenzlehre*. Berlin, Habel, 1885.
16. Fritsch, G. *Sitzungsber. Akad. Wiss, Berlin*, 1885 (1. Heft), 119-129.
17. Fritsch, G. *Süd-Afrika bis zum Zambesi*. Leipzig, G. Freytag, 1885.
18. Fritsch, G. *Die electrische Fische: I. Malapterurus* (1887). II. *Torpedo* (1890), Leipzig, Veit & Co.
19. Fritsch, G. *Sitzungsber. Akad. Wiss., Berlin*, 1891 (2. Heft), 941-970.
20. Fritsch, G. *Die Gestalt des Menschen*. Stuttgart, Neff, 1899; 2d ed., 1905.
21. Fritsch, G. *Aegyptische Volkstypen des Jetztzeit*. Wiesbaden, C. Kreidel, 1904.
22. Fritsch, G. *Uber Bau und Bedeutung der Area centralis des Menschen*. Berlin, G. Reimer, 1908.
23. Fritsch, G. *Das Haupthaar und seine Bildungstatte bei den Rassen des Menschen*. Berlin, G. Reimer, 1912. 2 vols.
24. Fritsch, G. and Hitzig, E. *Arch. Anat. Physiol. (Physiol. Abt.)*, 1870, 300-332.
25. Garrison, F. H. *An introduction to the history of medicine*, 4th ed. Philadelphia, Saunders, 1929.
26. Haller, Graf. *Anat. Anz.*, 1927, *64*, 257-269.
27. Jackson, J. Hughlings. *Trans. St. Andrews med. grad. Ass.*, 1870, 3, 162-207. Reprinted in *Selected writings*, 1931, vol. 1, pp. 8-36.
28. *J. Amer. med. Ass.*, 1927, *89*, 635. (Anonymous.)
29. *J. comp. Neurol.*, 1892, 2, 84-88. (Unsigned article.)
30. Leake, C. D., Ed. *Some founders of physiology*. Washington, D. C., American Physiological Society, 1956.
31. Mettler, C. C. *History of medicine*. Philadelphia, Blakiston, 1947.
32. Poggendorff, J. C. *Biographisch-literarisches Handwörterbuch*, 6th ed. Berlin, Verlag Chemie, 1937, p. 823.
33. U.S. Surgeon General's Office, *Index catalogue*, 2d Ser., 1900, 5, p. 1090.
34. Walker, A. E. *J. Neurophysiol.*, 1957, 20, 435-449.

Aristotle on the Anatomy of the Brain*

EDWIN CLARKE** and JERRY STANNARD**

ARISTOTLE's theory of brain function has been the subject of several inquiries.[1] Thus it is well known that, contrary to some of his predecessors and contemporaries,[2] he insisted that the brain had nothing to do with sensation. He argued that its main activity was to cool the heat produced by the heart[3] and that the heart and not the brain was the primary organ of sensation.[4] It is the purpose of this paper, however, to examine certain of his statements concerning the anatomy of the brain which, despite the attention paid them by several scholars, remain obscure.

On a number of occasions and in a variety of ways Aristotle asserts that the brain does not fill the cranial cavity and that there is a space in the occipital region. Thus he says: "In the first place then, the brain lies in the front part of the head. And this holds alike with all animals possessed of a brain; and all blooded

* An abbreviated form of this paper was read before the Johns Hopkins Medical History Club on 22 January 1962.

** Department of History of Science and Medicine, Yale University School of Medicine.

1 Some of the more recent are: T. E. Lones. *Aristotle's researches in natural science.* London, West, Newman and Co., 1912, pp. 173-179. J. I. Beare. *Greek theories of elementary cognition from Alcmaeon to Aristotle.* Oxford, Clarendon Press, 1906, pp. 329-330. A. Souques. *Étapes de la neurologie dans l'antiquité grecque (d'Homère à Galien).* Paris, Masson et Cie., 1936, pp. 105-115. Water Pagel. "Medieval and Renaissance contributions to knowledge of the brain and its function." Pp. 95-114 in *The history and philosophy of knowledge of the brain and its functions,* F. N. L. Poynter, Ed. Oxford, Blackwell, 1958.

2 Alcmaeon (G. S. Kirk and J. E. Raven. *The presocratic philosophers.* Cambridge, University Press, 1960, p. 233, fragment 284), Diogenes of Apollonia (*ibid.*, p. 442, fragment 616), one at least of the Hippocratic writers (E. Littré. *Oeuvres complètes d'Hippocrates.* Tome VI. Paris, J. B. Baillière, 1849, pp. 392-394, "De la maladie sacrée," 17.), Plato (F. M. Cornford. *Plato's cosmology, the Timaeus of Plato,* translated with a running commentary. New York, Liberal Arts Press, 1957, p. 293, 73C-D.), and others agreed that the brain was the central organ of the body.

3 *De partibus animalium* [P.A.], II, 7; 652 a 20. (Vol. V of Oxford translation). Most of Chapter 7 of Book III of this work deals with Aristotle's theory of brain function.

The following convention will be adopted when reference is being made to Aristotle's writings. The abbreviated title of the work will be followed by the book number in Roman, and the chapter number in Arabic numerals. A modified Bekker reference will be added; this will be the page number with the marginal line number from the Oxford translation of the works (*The works of Aristotle.* Translated into English under the editorship of J. A. Smith and W. O. Ross. Oxford, Clarendon Press) which coincides with, or precedes, the beginning of the citation.

4 *P. A.*, II, 10; 656 a 20ff contains Aristotle's argument in favour of the heart rather than the brain being the centre of sensation. Thus, *P. A*, II, 10; 656 a 25, ". . . it is the region of the heart that constitutes the sensory centre." Also, *De juventute et senectute, etc.* (Vol. III of Oxford translation) III; 469 a 5. "Hence in sanguinous animals the source both of the sensitive and the nutritive soul must be in the heart; . . ." *Ibid.*, 469 a 10, ". . . the supreme organ of the sense-faculties [is] in the heart, for it is here that we must look for the common sensorium belonging to all the sense organs."

animals are possessed thereof, and, by the way, molluscs as well,"[5] and "The back of the head is with all animals empty and hollow, whatever be its size in the different animals,"[6] and further, "The brain in all animals that have one is placed in the front part of the head."[7] There is no doubt that he includes man in these generalizations for, when discussing the human head, he states that "there is no brain in the hinder part of the head;"[8] likewise, "the front part of the head goes bald because the brain is there,"[9] and "men go grey on the temple first, because the back of the head is empty of moisture owing to its containing no brain."[10] When describing the human skull, he states that "the brain lies underneath the sinciput; the occiput is hollow,"[11] the "sinciput" being defined as the front of the skull, and again, "Above the brain is the thinnest and weakest bone of the head, which is termed 'bregma' or 'sinciput.' "[13] Finally he mentions "the cavity in the posterior part of the skull."[14]

At this stage it is necessary to clarify two points. The first is that as far as the normal, human brain is concerned, Aristotle's observations are incorrect. The second concerns terminology, for it is pertinent to enquire what Aristotle means when he uses the word *brain (encephalos).* The obvious interpretation is that the ancient Greeks used the term to indicate simply the structure "within the head."[15] There is no doubt that on many occasions Aristotle used it in this sense, meaning the whole brain, but there is clear evidence that he also employed it to signify the organ, excluding the cerebellum. Thus in two passages[16] he uses the word *parencephalis* to describe the cerebellum, but he uses the same general term, *encephalos,* to designate the remainder of the organ. Only in these passages is it possible to differentiate between the two uses of the word. But on the whole it seems likely that he

5 *Historia animalium* [*H.A.*] (Vol. IV of the Oxford translation), I, 16; 494 b 25.
6 *H.A.*, I, 16; 494 b 30.
7 *P.A.*, I, 10; 656 b 20.
8 *P.A.*, II, 10; 656 b 10.
9 *De generatione animalium* [*G.A.*] (Vol. V of the Oxford translation), V, 3; 784 a 1.
10 *G.A.*, V, 3; 784 a 30.
11 *H.A.*, I, 6; 491 a 30.
12 *Ibid.* "The front portion of [the skull] is termed 'bregma' or 'sinciput.' "
13 *Ibid.*, I, 16; 495 a 5.
14 *P.A.*, II, 10; 656 b 25.
15 Liddell, Scott, Jones. *A Greek-English lexicon.* Oxford, Clarendon Press, 1953. s.v. ἐγκέφαλος.
16 *H.A.*, I, 16; 495 b 30: "Behind this, right at the back, comes what is termed the 'cerebellum,' differing in form from the brain as we may both feel and see." *H.A.*, I, 16; 495 a 10: "From the eye there go three ducts to the brain: the largest and the medium-sized to the cerebellum, the least to the brain itself."

usually applied the word *brain* to the whole brain, as is the usual practice today.[17] On the other hand, in the passages under discussion, if he and his predecessors meant the term to indicate the cerebral hemispheres and underlying structures only, the statement that the main bulk of the brain is anteriorly placed in the cranial cavity would be easier to understand. But this would not account for the occipital space or sac which is an essential part of Aristotle's description.

In an attempt to explain these curious statements, it is necessary, in the first instance, to examine the information concerning the anatomy of the brain which was available to Aristotle. One of his primary objectives was to create a synthesis of Presocratic and Platonic knowledge, and it follows that he would be aware of what had been already contributed to the subject under discussion. As Cherniss[18] has pointed out, if he could demonstrate that his own theories coincided with those of earlier thinkers this was to him additional proof of their validity.

From a study of Presocratic sources, it is clear that a vague idea about the brain similar to the one found in Aristotle's writings was already in existence. Thus Plutarch records the story of how Pericles ordered the examination of the head of a one-horned ram. Anaxogoras, who opened the skull, found that "the brain did not fill the whole cavity, but had contracted itself into an oval form, and pointed directly to that part of the skull whence the horn took its rise."[19] Although elucidation of this anomaly is impossible from the scanty information available, much more substantial statements appear in the Hippocratic Writings. When discussing apoplexy, one writer states that "as for pain at the front of the head, it occurs because the veins are larger and because the brain is greater in the front part of the head than in the back."[20] Furthermore, in the book *On Wounds in the Head* it is stated that most of the brain lies under the front part of the skull and that there is less of it in the occipital region.[21]

17 This conclusion is in keeping with the statement of Galen (see C. Singer, *Galen on anatomical procedures*, London, Oxford University Press, 1956, p. 229) ". . . (ENKEPHALON. I give this name to the compound formed from both the back and front parts). . . . "

18 Harold Cherniss. *Aristotle's criticism of presocratic philosophy*. Baltimore, The Johns Hopkins Press, 1935, p. 349.

19 Plutarch. *Life of Pericles*, 6—Anaxagoras fr. A16 (in) Hermann Diels, *Die Fragmente der Vorsokratiker*. 5. Aufl., Walther Kranz, Ed. Berlin, Weidmann, 1934.

20 Hippocrates. *Diseases II*, 8 (Vol. VII, pp. 16-17, Littré Ed.).

21 *Hippocrates*. London, William Heinemann, 1927 (Loeb Classical Library, Vol. III, pp. 8-13), "On wounds in the head."

"The bone is thinnest and weakest at the bregma, and has the least and thinnest covering of flesh in this part of the head, and there is most underlying brain at this part

It seems certain that Aristotle was aware of this tradition. There are similarities between his own statements and those of the Hippocratic writers for, like them, he notes the weakness of the frontal bone.[22] In fact Poschenrieder[23] has used this passage to demonstrate how closely certain of his statements resemble ones found in the Hippocratic Writings. It is clear from the Hippocratic references, however, that while the authors of the two works mentioned considered the brain to be mainly in the anterior portion of the cranial cavity, unlike Aristotle they did not go further and say, as he did, that the occipital part is empty. There is no clue to indicate how their conclusions were arrived at, but they may have been based initially on simple observation of the human head. The "veins" referred to in the first passage are probably the superficial temporal arteries and they, like the front of the head itself, are more obvious than the corresponding, posteriorly located, structures. Concerning the passage from *On Wounds in the Head*,[24] the author may have been aware that the frontal lobes in man are somewhat larger and blunter than the occipital lobes. However, his conclusion that frontal wounds are more fatal than those in the occipital region is probably due, not to the greater bulk of brain anteriorly, but rather to the fact that depressed fractures with consequent infection were, no doubt, commoner in the frontal region and due also to the higher frequency of such wounds in battle and at other times.[25] It had been well established since the days of Homer, and even earlier, that adequate protection of this region was necessary during combat.[26] Finally, mention must be made of one of the most decisive influences on Aristotle's thought, that of Plato. But as regards the present problem, Plato,

of the head"; "and the greatest part of the brain lies under the bregma"; "also there is less brain in this part [occipital] of the skull."

In the book *Ancient medicine*, XXII (*ibid.*, Vol. I, 1923, pp. 56-59) it is argued that the head (and from the context, the brain within it, although the author does not say so) is likened in shape to a "broad hollow that tapers." Although the "tapering" may suggest the posterior part of the human brain, this deduction would be unwarranted, as the writer is here dealing with theoretical concepts, and in any case the word "tapering" could well be replaced by "contracting."

[22] *H.A.*, I, 16; 495 a 5. "Above the brain is the thinnest and weakest bone of the head, which is termed 'bregma' or 'sinciput.'"

[23] Franz Poschenrieder. *Die naturwissenschlaftlichen Schriften des Aristoteles in ihrem Verhältnis zu den Büchern den hippokratischen Sammlung*. Bamberg, B. Gartner, 1887, pp. 6-8.

[24] *Op. cit.* (note 21).

[25] Cf. Plato. *Gorgias*, 469D.

[26] H. Fröhlich. "Die Kopfbedeckung der Homerischen Helden." *Virch. Arch. Path. Anat.*, 1876, *68*, 381-398.

in the *Timaeus*,[27] merely emphasizes the importance of the front of the human body as compared with the back, an argument which Aristotle echoes.

Thus a tradition maintaining the presence of more brain in the anterior portion of the cranial cavity was already established before Aristotle's time, and it seems certain that he was aware of it. As far as can be determined from the writings available to us, Aristotle's predecessors did not attempt to explain it, but he endeavored to do so and, as we would expect, his approach is the one he always insisted upon — elucidation of function as a basic step.[28] In the first place, he points out that the brain is mostly in the front of the head because "the direction in which sensation acts is in front"; however, in view of the fact that he did not believe that the brain was a sensory organ, this statement is contradictory. Secondly, "the heart, from which sensation proceeds, is in front of the body," thus indicating again the superiority of the body's anterior surface; it is therefore fitting that the brain, which is second in importance only to the heart, should be situated near to it, rather than to the posterior surface. His final reason was that "the instruments of sensation are the blood-containing parts and the cavity in the posterior part of the skull is destitute of blood vessels."[29]

The first two explanations are neither convincing, nor are they easy for us to understand, although the influence of Plato's teachings is apparent in the second. The third, however, is even more difficult to comprehend, and its elucidation is to be found in Aristotle's account of the form and function of the brain and special senses. Having placed the seat of sensation in the heart rather than in the brain, he then had to account for the fact that the special sense organs in most animals are grouped around the brain and are seemingly in direct connection with it. Why should they be next to an organ which, according to Aristotle's beliefs, has no sensory function? He argues as follows, and in his discussion and explanation of the sense of hearing and sight, Aristotle exhibits three of the outstanding characteristics of his biological method: precise observation, interpretation and explanation of observa-

[27] Cornford, *op. cit.* (note 2), p. 151, 45A.
"And the gods, holding that the front is more honourable and fit to lead than the back, gave us movement for the most part in that direction. So man must needs have the front of the body distinguished and unlike the back; so first they set the face on the globe of the head on that side and fixed in it organs for all the forethought of the soul, and appointed this, our natural front, to be the part having leadership."

[28] *P.A.*, II, 9; 655 b 20. "Our knowledge [of such structures] must come from a study of their functions." Randall (J. H. Randall. *Aristotle*. New York, Columbia University Press, 1960) discusses this aspect of Aristotle's biological research, pp. 225-226.

[29] *P.A.*, II, 10; 656 b 20. These three arguments are listed here.

tional data, and the use of non-empirical, philosophical theories as legitimate explanatory categories.[30] As for the sense of vision, he states, it is evident why it is in the head; the eyes, like the brain, are moist and cold, and since the brain is demonstrably in the head, it follows that the eyes must be similarly located.[31] This argument by analogy may not convince, so a second reason is given; precise discrimination by certain senses is possible only if the blood supply to the organ in question is especially pure, and this is the case with the head.[32] Furthermore the eyes are not connected directly with the brain but rather with the vascular membrane which surrounds it, and thus by way of it, with the heart. Dealing now with hearing, Aristotle, who is here drawing upon established knowledge,[33] explains that it is dependent upon air for its function.[34] This air is enclosed in a chamber,[35] and the so-called empty space at the back of the head is likewise full of air.[36] He then speaks of "a channel which leads back again from each ear and connects it with the hinder part of the head.[37] Although not specifically stated it seems likely from the trend of Aristotle's argument that the connection here is with the occipital empty space.[38]

There are now two explanations possible for the proximity of the ears to the sensationless brain. Firstly, just as it is reasonable for the wet and cold eyes to be near the wet and cold brain, so it follows that the air of the ear is associated with the air-containing occipital space. Furthermore, the ears, like the eyes, are connected

30 Jerry Stannard. "The role of categories in historical explanation." *J. Philos.*, 1959, 56, 429-447.

31 This argument and its further development are to be found in *P.A.*, II, 10: 656 a 15 ff.

32 *P.A.*, II, 10; 656 b 1: "Moreover, it cannot but necessarily be that the more precise senses will have their precision rendered still greater if ministered to by parts that have the purest blood. For the motion of the heat of blood destroys sensory activity. For these reasons the organs of the precise senses are lodged in the head." (Cf. *P.A.*, IV, 10; 685 b 30 and *De somno et vigilia* (Vol. III of Oxford translation), III, 458 a 10.

33 The pre-Aristotelian theories of the sense of hearing are discussed in detail by Beare (*op. cit.* [note 1], pp. 93-111).

34 *De anima* (Vol. III of Oxford translation), II, 8; 419 b 30: "It is rightly said that an empty space plays the chief part in the production of hearing, for what people mean by 'the vacuum' is the air, which is what causes hearing, when that air is set in movement as one continuous mass."

35 *Ibid.*, II, 8; 420 a 15: "what we hear with is a chamber which contains a bounded mass of air."

36 *P.A.*, II, 10; 656 b 15. ". . . for what is called the [occipital] empty space is full of air."

37 *Ibid.*

38 A. Karsch. (*Aristoteles über die Theile der Thiere. Vier Bücher.* Stuttgart, 1855. No. 25 of a collection entitled "Neueste Sammlung ausgewählter Greichischer und Römischer Classiker verdeutsch" and cited by Sonnenburg [note 46], p. 13), Beare (*op. cit.* [note 1], p. 115), and others have also reached this conclusion.

with the heart by the way of the vascular cerebral membrane and not with the brain itself.[39] Secondly, since the occipital cavity is bloodless,[40] it, like the brain, must be devoid of sensation, and Aristotle can conclude that the associations and connections of the ears with it cannot be for sensory purposes. This is another argument he is able to use to explain the location of the special sense organs in the head, despite the fact that they are, according to his theory, governed by the heart and not by the brain. Although his proposition is not easy to follow, it is nevertheless clear that the air-filled occipital space is an integral and necessary part of it. As Thompson has concluded, part of the reason for Aristotle's insistence on the presence of the occipital space is his belief that hearing is associated with the element air.[41]

It is obviously of importance at this stage to know whether Aristotle had any first-hand knowledge of the inner structure of the adult human body. Owing to the magical beliefs which at this time were associated with death and the dead body, human dissection was not practised and there is no evidence that he dissected a human cadaver.[42] Portal[43] and Lones [44] on the basis of his description of the brain conclude that Aristotle could never have opened a human skull. He did, however, have some empirical knowledge of the animal brain and its coverings, as is clear from several of his statements.[45]

Having considered Aristotle's own justifications and explanations for his peculiar description of the brain, we can now discuss the opinions of others. In the first place, certain authors have

39 *G.A.*, II, 6; 744 a 1. "These passages [of the ears] end at the small blood vessels about the brain which run thither from the heart."

40 *P.A.*, II, 10; 656 b 25. "The cavity in the posterior part of the skull is destitute of blood vessels."

41 *P.A.*, II, 10; 656 b 20, footnote 3.

42 Ludwig Edelstein. ("Die Geschichte der Sektion in der Antike." *Quell. Stud. Gesch. Naturwiss. Med.*, 1932, 3, 50-106, and "The development of Greek anatomy." *Bull. Hist. Med.*, 1935, 3, 235-248) has discussed the general problem of human dissection in antiquity, and Lones (*op. cit.* [note 1], pp. 102-106) has assembled the evidence which indicates that Aristotle had not dissected a human cadaver.

43 *Baron* A. Portal. *Histoire de l'anatomie et de la chirurgie.* Paris, Fr. Didot le jeune, 1770, Vol. 1, p. 42: "selon lui, le derrière de la tête étoit vuide; se que prouve qu'il n'avoit jamais ouvert de crane."

44 *Op. cit.* [note 1], p. 103.

45 He identified an inner vascular membrane (pia mater and pia arachnoid) and an outer stronger one (dura mater) (*H.A.*, I, 16; 494 b 25): he knew that the brain has two halves (*H.A.*, I, 16; 494 b 30) and that the cerebellum lies posteriorly and differs in texture and appearance from the rest of the brain (note 16): the "hollow space" inside the brain (*H.A.*, I, 16; 495 a 5) is no doubt the ventricular system and the fluid he mentions (*P.A.*, II, 6; 744 a 5) was probably the cerebrospinal fluid.

passed the pertinent statements in silence,[46] while others have dismissed them as errors of observation.[47] Lewes, who is always ready to criticise Aristotle, does so on the grounds of these "surprising and unintelligible assertions that there is no brain in the back part of the skull."[48] He claims that this is "the climax of inaccuracy" and that "Aristotle could never have dissected a human subject, perhaps had never seen one laid open; or else they prove that his inspection was careless, his memory treacherous, and his anatomical knowledge extremely superficial."[49] To support these authors there are other examples in Aristotle's writings of inaccurate descriptions of human structures.[50] It is also well known that in the case of some animals (the lion and the crocodile, for example) he was citing the opinions of others and he included their errors; he says, that, unlike other animals, the lion and the wolf have only one cervical vertebra.[51] However, the frequent repetition of the intracranial findings, the varying forms of description, and his own elucidations of them seem to make this possibility unlikely; similar objections could be levelled at those who have contemplated

[46] A. G. Camus. *Histoire des animaux d'Aristote, avec la traduction françoise.* Paris, Desaint, 1783. Vol. I, I/vii, pp. 24-25. Although no comments accompany the text and translation, Vol. II (*Notes sur l'histoire des animaux d'Aristote*) contains lengthy accounts of all the animals recorded in Aristotle's writings, but there is no general reference to the anatomy of the brain.

F. Susemihl. "Kritische Studien zu den zoologische Schriften des Aristoteles." *Rhein. Mus. Philol.*, 1885, *40*, 563-598.

Alfred Volprecht. *Die physiologischen Anschauungen des Aristoteles.* Inaugural—Dissertation, Universität Greifswald. Greifswald, Julius Abel, 1895, p. 16.

Lones, *op. cit.* [note 1], p. 177.

A. L. Peck. *Aristotle. Parts of animals with an English translation.* London, William Heinemann, 1937, pp. 176-179. *Idem. Aristotle. Generation of animals with an English translation.* London, William Heinemann, 1943.

Ingemar Düring. *Aristotle's De partibus animalium. Critical and literary commentaries.* Göteborg, Wettergren and Kerber, 1943. This author, however, like Susemihl (*v. supra*), considers philological problems only.

Louis Bourgey. *Observation et expérience chez Aristote.* Paris, Librarie Philosophique, J. Vrin, 1955, pp. 83-94. Earlier translators and commentators (for example, Fr. Strack: *Aristoteles Naturgeschichte der Thiere,* Frankfort, 1816, cited by Ludwig Sonnenburg, *Zoologisch-kritische Bemerkungen zu Aristoteles Thiergeschichte.* Bonn, Carl Georg, 1857, p. 9.), although recognizing the problem, have no solution to offer.

[47] Jules Geoffroy. *L'anatomie et la physiologie d'Aristote.* Thèse de Paris. Arcis-sur-Aube, Ch. Chapelle, 1878, p. 79.

[48] G. H. Lewes. *Aristotle. A chapter from the history of science, including analyses of Aristotle's scientific writings.* London, Smith, Elder and Co., 1864, p. 166.

[49] *Ibid.*, p. 167.

[50] Cranial sutures (*H.A.*, I, 7; 491 b 1); the uterus (*G.A.*, I, 3; 716 b 30); the kidney (*P.A.*, III, 9; 671 b 5), although in this instance some have argued that Aristotle was describing the lobulated, human, foetal kidney (see Ogle's footnote 4 to *P.A.*, III, 9; 671 b 5); the spleen (*H.A.*, I, 17; 496 b 15); the ribs (*H.A.*, I, 15; 493 b 10); and the heart (*H.A.*, I, 17; 496 a 1; *P.A.*, III, 4; 666 b 20).

[51] *P.A.*, IV, 10; 686 a 20.

textual errors.[52] Aubert and Wimmer[53] have suggested inexpediency in the removal of the brain from the skull, but this likewise is improbable.

Some have adopted a philological approach to the problem. Thus Soury[54] observed that the word "kytos"[55] was also used when a "small hollow" in the centre of the brain was alluded to.[56] Arguing that in the latter statement the ventricular system was intended, he thought that when the same word was used in describing the posteriorly placed intracranial cavity, Aristotle was referring to the fourth ventricle. There is little to support this suggestion, and Soury himself later abandoned the idea. It had been put forward originally by Sprengel[57] whose reasoning, however, does not seem to have been philological. Sonnenburg[58] defends Aristotle by maintaining that the word *inion,* usually employed to describe the occipital portion of the skull,[59] can be translated as *the neck.* Even if this were so, the difficulties of interpretation are by no means surmounted, for, as Lewes observes, "the neck is not more empty than the skull.[60]

Since these explanations are all unsatisfactory, in a search for a more appropriate elucidation it can be argued that if Aristotle did not dissect an adult human brain, his information may have been derived either from the examination of a human foetus, from the observation of pathological conditions in man, or from the dissection of living forms other than man.

Concerning the first possibility, Lones[61] has discussed Aristotle's conceivable experience with human embryological material,

52 Barthélemy Saint-Hilaire. *Histoire des animaux d'Aristote.* Paris, Librarie Hachette et Cie, 1883, p. 44, footnote 3. A. von Frantzius (*Aristoteles vier Bücher über die Theile der Thiere.* Leipzig, Wilhelm Engelmann, 1853, note 53 on p. 280) justifiably denies this possibility.

53 H. Aubert and Fr. Wimmer. *Aristoteles Thierkunde kritisch-berichtigter Text, etc.* Leipzig, Wilhelm Engelmann, 1868, Vol. I, p. 215, footnote 39.

54 Jules Soury. *Ie système nerveux central. Structure et fonctions. Histoire critique des théories et des doctrines.* Paris, Georges Carré et C. Naud, 1899, p. 107

55 *P.A.*, II, 10; 656 b 25. In the Oxford translation this is given as *cavity*— ". . . and the cavity in the posterior part of the skull is destitute of blood vessels"—whereas Peck (*op. cit.* [note 1], p. 179) prefers "sac"—". . . whereas the sac at the back of the head contains no blood vessels at all."

56 *H.A.*, I, 16; 495 a 5.

57 Kurt Sprengel. *Histoire de la médecine depuis son origine jusqu'au dix-neuvième siècle,* A. J. L. Jourdan, Tr. Paris, Deterville and Th. Desoer, 1815, Vol. I, p. 389: "Il existe dans la tête un espace vide; c'est vraisemblablement des ventricules du cerveau dont il est question ici."

58 Sonnenburg, *op. cit.* (note 46), pp. 11-12.

59 *H.A.*, I, 7; 491 a 30.

60 *Op. cit.* (note 48), p. 167.

61 *Op. cit.* (note 1), p. 104.

and Menetrier[62] has gone further by suggesting that the Hippocratic writers, as well as Aristotle and other early Greek scientists, obtained their knowledge of human structure from the dissection of still-born foetuses and new-born infants. It is known that Aristotle examined a male human foetus of about 40 days,[63] and in this connection he makes a curious statement: the human and animal foetal brain is large and fluid, he says, but later, due to evaporation and coction, it shrinks and becomes more solid.[64] However, there is no evidence that any space exists in the occipital region of the normal embryo either at term or at any time during its development.[65]

Pathological conditions of the brain and skull of the human foetus or adult must be considered next. Such lesions as porencephalic cysts of the occipital lobes, a congenital occipital encephalocele, or cerebral cysts of vascular, neoplastic, or parasitic etiology might possibly produce a state of affairs approximating Aristotle's various descriptions. No known lesion, however, could produce the empty or air-filled space which his accounts demand, except perhaps the presence of gas-forming organisms in a decomposing brain examined in a corpse lying prone. He may have encountered cranial injuries, since it seems likely that he saw the results of battle trauma,[66] although only once is a head injury mentioned;[67] and perhaps other pathological states were called to his attention.[68] It is natural to consider here the possible influence of the Hippocratic work *On Wounds in the Head*. Although it has already been argued that a connection probably exists, a satisfactory answer concerning clinical details is not forthcoming. In any case it is difficult to understand how any of the known traumatic cranial or

62 P. Menetrier. "Comment Aristote et les anciens médecins Hippocratiques ont-ils pu prendre connaissance de l'anatomie humaine?" *Bull. Soc. franç. Hist. Méd. (Paris)*, 1930, *24*, 254-262. Theodor Gomperz *(Greek thinkers. A history of ancient philosophy*, G. G. Berry, Tr. New York, Charles Scribner's Sons, 1912, Vol. IV, p. 140) also supports this belief.

63 *H.A.*, VII, 3; 583 b 10. Ogle, commenting upon *P.A.*, III, 9; 671 b 5 (footnote 4), uses Aristotle's description of the human kidney as additional evidence for this.

64 *G.A.*, II, 6; 744 a 15. Aristotle is discussing the embryology of the eyes and the brain. Concerning the latter, he says: ". . . at first it is liquid and large, but in course of evaporation and concoction it becomes more solid and falls in."

65 W. T. Peyton. "A study of developmental cranio-cerebral topography as determined by the orthoscopic method." *J. nerv. ment. Dis.*, 1933, *78*, 232-249, 381-399.

66 In *P.A.* III, 3; 664 b 15. He mentions penetrating wounds of the stomach and speaks of battle wounds in *P.A.*, III, 10; 673 a 10, but on this occasion it is clear that he is citing the experiences of others.

67 He describes a blow in the temporal region which produced unilateral amblyopia *(De sensu* [Vol. III of Oxford translation], II; 438 b 10); in this regard, it is now known that the site of election for trauma which results in an optic nerve lesion is, as in this case, the outer and upper portion of the orbital rim.

68 *P.A.*, III, 5; 667 b 1. He mentions here the various disease processes discovered in sacrificial victims, but these are restricted to the abdominal and thoracic viscera.

cerebral lesions could have suggested an empty occipital region as a constant feature of the human and animal skull.

On the basis of the foregoing it seems unlikely that Aristotle had any empirical anatomical evidence for his assertions concerning the human brain, and the final possibility must now be discussed. He admits that when he lacked data on human anatomy, especially that of internal structures, he generalized from his knowledge of lower animals,[69] and he justifies this practice on the grounds that there is a correspondence between human structure and its homologue in vertebrates of a lower order.[70] Even so, it is still difficult for us to understand how he was able to make such transferences,[71] especially as he states that both external and internal parts vary in different animals.[72] Biological generalizations, although forming one of the foundations of his researches in physiology and anatomy, and although responsible for his most remarkable success, led him astray occasionally. He continually sought equivalents of the form and function of tissues and organs of one class of animals to all others.[73] Moreover, for him there was no distinct line between cold—and warm-blooded animals, which to us is fundamental. It can therefore be suggested that some of his statements about the brain in general, including that of man, may have been derived from his experience with lower animals, and perhaps with the cold-blooded species in particular.

Part of Aristotle's general theory of brain function depends upon the idea that the brain is bloodless and he repeats this statement on several occasions.[74] But, as Lewes[75] indicates, this may have arisen from the inspection of a fish brain, or a brain that had been cooked; he does in fact mention the changes observed when a brain, presumably of an animal, is boiled.[76] Furthermore, as

[69] *H.A.*, I, 16; 494 b 20. "For the fact is that the inner parts of man are to a very great extent unknown, and the consequence is that we must have recourse to an examination of the inner parts of other animals whose nature in any way resembles that of man."

An example of inference in man is given in P.A., IV, 2; 677 a 5: "For, almost invariably, those who suffer from these forms of disease [acute] are persons who have no gall-bladder at all, as would be quite evident were they to be dissected." Cf. *Politics*, VII, 15; 1336 a 5.

[70] Cf. *P.A.*, I, 4; 644 b 5 sq. For a discussion of this and related passages, see F. S. Bodenheimer. *The history of biology*. London, Dawson, 1958, pp. 15-16.

[71] Examples which are easier for us to understand are as follows: he identified the dog's stomach (*H.A.*, I, 16; 495 b 20), as well as the pig's lower gut (*ibid.*) and spleen (*H.A.*, I, 17; 496 b 20) with those of man.

[72] *P.A.*, III, 4; 665 b 1.

[73] See Bodenheimer (note 70), pp. 15-17.

[74] For example: "The brain of all animals is bloodless, devoid of veins, and naturally cold to the touch." (*H.A.*, I, 16; 495 a 5); "the brain itself in all animals is destitute of blood, and no vein, great or small, holds its course therein." (*H.A.*, III, 3; 514 a 15); "for in fact it [the brain] has no blood at all in its proper substance." (*P.A.*, II, 7; 652 a 35).

[75] *Op. cit.* (note 48), p. 166.

[76] *P.A.*, II, 7; 653 a 20.

already noted, according to Aristotle the brain of the developing animal, instead of growing, shrinks.[77] Now there are at least two passages in his writings which indicate that he examined the brain of a fish,[78] and it is well known that whereas the brain in the fish embryo fills the cranial cavity completely, owing to the disproportion between its growth and that of the skull, in the adult it occupies only a portion of the potential space.[79]

Further attention is drawn to the possible role of cold-blooded animals by Ogle when he comments upon the passage, "for there is no brain in the hinder part of the head."[80] Moreover, Thompson[81] has remarked upon Aristotle's considerable knowledge of marine biology, and it is clear from his writings that he was as well acquainted with cold-blooded animals as he was with warm-blooded species. In fact, it is likely that he had a wider knowledge of their internal structure, for of the 49 animals he is thought to have dissected,[82] 29 are poikilothermal; of these there are four kinds of reptiles and 22 amphibians, fish, and lower orders of aquatic life. Ogle[83] points out that in certain reptiles, as well as in fish already mentioned, the brain does not fill the cranial cavity completely.

One reptile with which Aristotle was familiar is the turtle. Certain varieties of this animal have been amphibious marsh dwellers since the late Triassic,[84] and a habitat such as he is known to have encountered on the shores and in the shallow lagoons of the Aegean and where he carried out most of his biological research[85] would be ideal for them. Sundevall[86] has identified the varieties of

[77] *Op. cit.* (note 64).

[78] *H.A.*, IV, 8; 533 b 1 and *H.A.*, I, 16; 495 a 10.

[79] C. L. Herrick and C. J. Herrick: "Contributions to the morphology of the brain of bony fish." "Siluridae" by C. J. Herrick. *J. comp. Neurol.*, 1892, *1*, 211-245 (see p. 212): "the brain practically ceases to grow when the fish attains a modest size—the cranial cavity, however, enlarges more nearly in proportion to the size of the head. In larger specimens it is more than twice the size of the brain, which lies in the ventral and caudal portion." Ogle (*P.A.*, II, 10; 656 b 10, footnote 1) also notes the phenomenon. Geoffroy (*op. cit.* [note 47], p. 79, footnote 1), when commenting on Aristotle's description of the brain, mentions the fish brain.

[80] *Op. cit.* (note 79).

[81] D'Arcy W. Thompson. "On Aristotle as a biologist": in *Toward modern science*, R. M. Palter, Ed. New York, Noonday Press, 1961. Vol. I, pp. 66-67. H. D. P. Lee ("Place names and the dates of Aristotle's biological works." *Class. Quart.*, 1948, *42*, 61-67) has also examined this aspect of Aristotle's biological studies.

[82] Lones, *op. cit.* (note 1), p. 106.

[83] *Op. cit.* (note 79).

[84] A. S. Romer. *Osteology of the reptiles*. Chicago, The University of Chicago Press, 1956, pp. 496-497.

[85] Thompson and Lee, *op. cit.* (note 81).

[86] C. J. Sundevall. *Die Thierarten des Aristoteles von den Klassen der Säugethiere, Vögel, Reptilien und Insekten.* (Übersetzung aus dem Schwedischen) Stockholm, Samson and Wallin, 1863, pp. 174-175. See also Camus (note 46, Vol. II, pp. 309-310 and pp. 811-813) who also discusses the species of turtle Aristotle is likely to have examined.

turtle which Aristotle probably encountered: the marine,[87] the fresh-water,[88] and the terrestrial species.[89] He may also have been familiar with the larger species from the Arcadian forests reported by Pausanias,[90] or from the Indian Ocean and Red Sea described by several authors of Graeco-Roman times.[91] In this respect, Agassiz[92] notes the remarkable similarity between the general structure of the brains of various species of turtles, although minor variations in specimens of different families do occur.

Aristotle mentions the turtle on several occasions[93] and there is no doubt that he dissected this reptile. Moreover, he must have vivisected one in order to examine the heart *in vivo*.[94] He does not, however, mention the skull or brain, although he does describe the kidneys. Here an interesting observation can be made. When dealing elsewhere with the human kidney he says that it is lobulated: "as it were made up of numerous small kidneys, and not presenting one unbroken surface."[95] This is the passage which suggested to Ogle[96] that Aristotle had examined a human fetal kidney which has a lobulated structure, whereas the adult organ does not. However, when describing the turtle kidney, which he correctly records as lobulated,[97] Aristotle makes a statement very similar to the one just cited: "it looks like one single organ composed of a number of small ones."[98] Although the kidney is also lobulated in the ox, elephant, and bear, as far as is known he dissected only the first two of these and records his findings concerning the kidney, and these correctly, only in the ox.[99] It is conceiva-

87 For example *P.A.*, II, 8; 654 a 5. ". . . namely, the Tortoises, including the Chelone and the several kinds of Emys." *Chelone* was used in Greece generally for land turtles, and also as a generic term for any turtle.

88 *H.A.*, V, 33; 558 a 5. "The hemys, or freshwater tortoise." *P.A.*, III, 9; 671 a 30: "The Emys has neither bladder nor kidneys." This is probably *Emys orbicularis*, the European pond tortoise discussed by Camus (*op. cit.* [note 46], Vol. II, pp. 309-310) and by Lones (*op. cit.* [note 1], p. 238). See also *P.A.*, III, 8; 654 a 5.

89 For example, *Testudo graeca* of southeast Europe, or *T. marginata*.

90 *Description of Greece*. Book VIII, xxiii, 54: ". . . and tortoises [chelonas] of vast size. One could of the last make harps not inferior to those made from the Indian tortoise [chelones]."

91 Pliny. *Natural history*, IX, 12, 35 sq. *Diodorus of Sicily*, III, 21. Strabo. *Geography*, XVI, iv, 14. Lenz (H. O. Lenz. *Zoologie der alten Griechen und Römer*. Gotha, Becker, 1856, pp. 413-418) gives other references to the turtle in the writings of classical antiquity.

92 Louis Agassiz. *Contributions to the natural history of the United States of America*. First Monograph, Vol. I. Boston, Little, Brown and Co., 1857. Part II, "North American Testudinata," p. 362. "All turtles agree among themselves very remarkably in the structure of the brain."

93 Hermann Bonitz. Reprint edition Graz: Akademische Verlag, 1955, p. 244a 37-60 s.v. ἐμύς and pp. 849b 19-850a 10 s.v. χελώνη.

94 *De juventute et senectute*, II, 468 b 15.

95 *P.A.*, III, 9; 671 b 5.

96 *Ibid.*, footnote 4.

97 C. K. Reichert. *The anatomy of the chordates*. New York, McGraw-Hill Book Co., Inc., 1958, p. 254.

98 *H.A.*, II, 17; 506 b 25.

99 *Ibid.*: "In the turtle the kidney resembles the same organ in the ox."

ble, therefore, that he was transferring his anatomical knowledge of the turtle to man and, if he did this with the kidney, it is not unreasonable to suggest that he could have done the same with the brain, although a similar use of other reptiles or even other animals is a possibility which cannot be excluded.

The turtle is the reptile selected by Ogle[100] for special mention when he comments upon Aristotle's claim that there is no brain in the posterior portion ofthe head. As has already been noted, the brain of fish and of some reptiles does not fill the cranial cavity completely. This is also true of the turtle. Lamarck[101] thought this feature to be of such fundamental importance that he employed it as one of the criteria in his proposed classification of the animal kingdom. Thus fish and reptiles are considered to have, amongst other distinguishing features, nerves which end in a brain the volume of which does not equal that of the cranium, whereas in birds and mammals it does. Desmoulins[102] as long ago as 1825 pointed this out in fish and turtles and found that the brain of the latter occupies only two-thirds of the potential space; a more recent observer,[103] however, estimated the brain volume as not more than one-third of the cranial capacity. An interesting observation in this respect was made by Agassiz in 1857 when, having stated that "the form of the brain [of the turtle] has no immediate bearing upon the form of the skull," he remarks upon the obvious contradiction this makes with the doctrine of phrenology.[104] Although Aristotle makes no mention of the turtle skull or brain, he seems to have been aware of the disparity between brain and skull volumes, and he may have observed the phenomenon in the turtle as well as in the fish.[105]

But before looking more closely at the intracranial possibilities for his general statements about the form of the brain, we must examine an aspect of the reptilian skull itself. Regarding a passage

100 *Op. cit.* (note 79).

101 J. B. A. P. Monet de Lamarck. *Philosophie zoologique.* Paris, Librairie F. Savy, 1873, Vol. I, p. 276.

102 A. Desmoulins. *Anatomie des systèmes nerveux des animaux à vertèbres, appliquée à la physiologie et à la zoologie.* Paris, Méquignon-Marvis, 1825, Vol. I, p. 109. "Mais dans la plupart des reptiles et dans tous les poissons, le volume du cerveau est quelquefois moindre que le tiers et même que la moitié de la capacité du crâne." In the section on the cranium (J. Malyn, pp. 724-726 of *The cyclopaedia of anatomy and physiology,* R. B. Todd, Ed., London, Longman, *et al.,* 1835-1836, Vol. 1, A-Dea, p. 724) Todd adds an editorial comment that "according to Desmoulins the area of the vertical section of the brain in the European tortoise is nearly one-third less than the area of the cranial cavity; and in fishes, whether osseous or cartilaginous, the disproportion is constantly still greater."

103 O. D. Humphrey. "On the brain of the snapping turtle (Chelydra Serpentina)." *J. comp. Neurol.,* 1894, *4,* 73-116 (see p. 75).

104 *Op. cit.* (note 92).

105 *Op. cit.* (note 64).

from the *Historia animalium*,[106] it can be argued that when Aristotle says that "the occiput is hollow," he is in fact referring to the cranial bone itself, rather than to that portion of the intracranial cavity which underlies it. The term *inion*, like our word *occiput*, may have referred to the occipital bone as well as to the posterior part of the head, inside or outside. If this were so, one might suppose that Aristotle is indicating the skull vacuities of certain animals, spaces which are especially characteristic of some reptiles. A vacuity is a space which is produced when two or more bones draw apart during development, but they are found only in the temporal region and they do not occur in the turtle skull.[107] Some species of turtle and some other reptiles have a deficiency of the occipital bones or a defect in the posterior temporal region, but these do not represent vacuities[108] and Aristotle could not have encountered the species in which they occur most commonly, the North American snapping turtle (Chelydridae).[109]

As Aristotle specifically mentions a *cavity* at the back of the head[110] and also places it in relationship with the air-filled ear,[111] it is reasonable that the mastoid air cells should be suggested as a possible solution to the present problem. Thus Aubert and Wimmer[112] believed that Aristotle must have been referring to the mastoid air cells or frontal sinuses, which in some animals, the ox for example, have considerable posterior extensions. The role of the mastoid cells was also favoured by Thompson,[113] who points out how they may be readily demonstrated by simply percussing the mastoid process; it is, however, difficult to agree with this author if one taps different areas of the skull. On the whole these claims are far from satisfactory.

If Aristotle had opened the skull of a turtle, it is interesting to

106 *H.A.*, I, 7; 491 a 30. "The brain lies underneath the sinciput; the occiput is hollow." (". . .; τὸ δ'ἰνίον κενόν") Cf. note 59.

107 J. T. Saunders and S. M. Manton. *A manual of practical vertebrate morphology*. London, Oxford University Press, 1949, pp. 130-132.

108 Romer, *op. cit.* (note 84), p. 99.

109 A. d'A. Bellairs. *Reptiles. Life, history, evolution, and structure*. New York, Harper and Brothers, 1957, p. 66.

110 *Op. cit.* (note 55).

111 *Op. cit.* (note 36).

112 Aubert and Wimmer (*op. cit.* [note 53], p. 215, footnote 3) say that Schneider was the first to make this suggestion, but this could not be verified in J. G. Schneider. *Aristotelis de animalibus historiae*. Liber X. Tomus III. Lipsiae, in Bibliopolio Hahniano, 1811. Franzius (*op. cit.*, note 52) should also be mentioned in this regard. He comments on *P.A.*, II, 10; 656 b 10 (see text quotation to which note 8 refers) and he may be referring to Schneider when he points out that the frontal sinus is a most unlikely possibility. Apart from also denying that the passage (*P.A.*, II, 10; 656 b 10) could have been distorted by textual corruption, or that it is a faulty interpretation, he has no explanation to offer for the occipital space.

113 *H.A.*, I, 7; 491 a 30, footnote 5.

consider what he may have discovered. The brain of the turtle is not too small to be examined macroscopically[114] and in this regard it is interesting to note that Aristotle was able to examine carefully and describe accurately the eye of the mole[115] despite the fact that it is only 1/25th of an inch in diameter.

When the skull of a turtle is opened from behind,[116] the meningeal membranes hang loosely in the cavity and when these are divided it is evident that the brain does not fill the cranial cavity. As the brain tapers caudally, and as the frontal portion is disproportionately large, one gains the impression that there is in fact more of the organ in the anterior part of the cavity. Furthermore, the empty space, although present anteriorly, seems to be greater posteriorly. Lones[117] makes the interesting observation that Aristotle probably dissected animals placed in a vertical, or near-vertical, position. If this were so, when he opened the skull of a specimen and breached the meninges, the cerebrospinal fluid would drain away more effectively than if the specimen were in a horizontal position. In cases where the skull was not completely full of brain, a cavity between the calvarium and the organ would thus be produced, and his statement that "the back of the head is empty of moisture owing to its containing no brain"[118] should be noted in this regard.

The roof of the capacious fourth ventricle is covered by the telachoroidea. In addition, Munson[119] has described what he calls a brain bladder in this area, a structure which is characteristic of the turtle brain; it is also present in man but only at an early stage of development. It is a closed sac lying in the subarachnoid space but distinct from it. It projects through the pia at the caudal end of the fourth ventricle on the dorsal surface of the brain and fills the posterior part of the cranial cavity, for it has the dimensions of "a good-sized soap bubble."[120] In a traverse section of the skull it can be seen reaching out to the inner table of the skull. It is not always possible to demonstrate this structure but it is known that in elasmobranch fish tilting the body will induce gravitation of fluid to the caudal extremity of the fourth ventricle

114 J. P. Munson. "Chelonian brain-membrane, brain-bladder, metapore and metaplexus." *J. comp. Neurol.*, 1913, *7*, 169-180 (p. 169).

115 *H.A.*, IV, 8; 533 a 1 and *H.A.*, I, 9; 491 b 25.

116 The North American *Pseudemys scripta elegans*, or red-eared turtle, was dissected.

117 *Op. cit.* (note 1), p. 103. Cf. also Thompson *op. cit.* (note 81), p. 71.

118 *G.A.*, V, 4; 784 b 30.

119 Munson, *op. cit.* (note 114).

120 *Ibid.*, pp. 173-175.

with the consequent protrusion of its membranous roof.[121] This also occurs in the turtle, for Humphrey describes the roof membrane extending caudally as a distinct pocket and observes that it "takes whatever form pressure and gravitation may dictate."[122] Thus tilting the specimen, as may have been Aristotle's custom, may have induced bulging of the roof of the fourth ventricle with the possible demonstration of the bladder. In one of Aristotle's passages already cited he speaks of a *kenos,* or *cavity,* or *sac* at the back of the head.[123] The structures here described may possibly account for these assertions. Moreover, if Aristotle vivisected the turtle's brain as well as its heart,[124] these parts might have been more striking than is the case in the usual preserved specimen of today; they have, of course, never been described in the unanesthetized, living animal by modern anatomists or zoologists.

Finally, there is another interesting anatomical structure which should be mentioned. During the early development of the human internal ear the endolymphatic duct is prominent, although later it is of insignificant size. The duct is a tubular extension of the sacculus and passes through the vestibular aqueduct to end intradurally as the endolymphatic sac.[125] The duct and its sac are more highly developed in certain lower animals, especially in fish and certain reptiles. In the turtle and several lizards, the sacs are of considerable size.[126] They lie in the intracranial cavity dorsal to the caudal end of the brain and reach up to the longitudinal dural sinus.[127] Their prominence is inferred from a general statement of Romer: "the brain case in reptiles is not, in general, closely appressed to the brain in all areas, and other structures (such as endolymphatic and perilymphatic sacs) may be present in the endocranial cavity."[128] They do not connect with the subarachnoid space and although they are associated with the vestibular apparatus, their function is obscure. According to Dempster, "a tube leads from the main sacs cephalo-ventrad along

121 J. A. Blake. "The roof and lateral recesses of the fourth ventricle, considered morphologically and embryologically." *J. comp. Neurol.,* 1900, *10,* 79-108 (see p. 96).

122 Humphrey, *op. cit.* (note 103).

123 *Op. cit.* (note 55).

124 *Op. cit.* (note 94).

125 T. H. Bast and B. J. Anson. *The temporal bone and the ear.* Springfield, Ill., Charles C Thomas [1949], pp. 43-62.

126 Romer, *op. cit.* (note 84), p. 36. See also Franz Keibel. "Der ductus endolymphaticus (Recessus labyrinthi) bei Schildkröten." *Anat. Anz.,* 1915-16, *48,* 466-474, where the ducts are shown by serial section in the embryo.

127 W. T. Dempster. "The morphology of the amphibian endolymphatic organ." *J. Morphol.,* 1930, *50,* 71-120. See also Guiseppe Sterzi: "Il sacco endolinfatico. Ricerche anatomiche ed embriologiche." *Gegenbaurs morph. Jb.,* 1909, *39,* 446-496 (see pp. 476-479).

128 *Op. cit.* (note 84), p. 21.

the lateroventral margin of the cerebellum to the ear cavity,"[129] but both this and the thin-walled sacs may be difficult to identify.

As we have seen earlier, when Aristotle is discussing the faculty of hearing, he says "there is a channel which leads back again from each ear and connects it with the hinder part of the head."[130] As a step in the formulation of his theory of brain function the channel is of considerable importance. The word *channel (poros)* creates the usual difficulties, and Ogle[131] gives a brief summary of a much discussed problem. Whereas some believe that blood vessels are referred to in this passage, Ogle suggests the internal auditory meatus which in man carries the auditory and facial nerves. From the above consideration, however, there seems to be also a third possibility.

Another reptile with which Aristotle was familiar, perhaps even more so than with the turtle, is the chameleon.[132] He states that "the brain is situated a little above the eyes, but connected with them."[133] Although this may suggest an anteriorly placed brain, the shape of the animal's skull and the large size of its eyes must be taken into account.[134] The relative volume of brain and skull, and well-developed endolymphatic sacs, make comparisons with the turtle possible. Aristotle seems to have vivisected this animal, as well as the turtle.[135]

Numerous tentative explanations for Aristotle's description of the skull and brain have been presented but it should be emphasized that possibly none of them is appropriate. Of all the ancient philosophers Aristotle is perhaps the most difficult to comprehend adequately, and in a problem such as the present one it is not easy to separate the various strands that enter into the composition of this argument. But while it must not be forgotten that he was the first biologist of rank, equally so, it must not be overlooked that he was also a philosopher. If it can be substantiated that he viewed

129 *Op. cit.* (note 127), p. 107.

130 *P.A.*, II, 10; 656 b 15.

131 *P.A.*, II, 10; 656 b 15, footnote 2.

132 Thompson (*op. cit.* [note 81], p. 67) notes that the chameleon is common in the Aegean Islands where Aristotle did his work but does not occur on the Greek mainland.

133 *H.A.*, II, 12; 503 b 15.

134 Julia Gisi: "Das Gehirn von Hatteria punctata." *Zoolog. Jb. Abt. Anat. Ontog.* (Jena), 1908, *25*, 71-236 (see pp. 216-217). The author compares the New Zealand tuatara with reptiles, including *Chamaeleo vulgaris*. The literature on the chameleon brain is very meager, and such articles as P. Ramón. "Estructura del encéfalo del camaleon." *Rev. trimest. Microgrâf. (Madrid)*, 1896, *1*, 46-82 deal only with histological appearances. Mention should be made of one earlier work: Claude Perrault. *Description anatomique d'un chameleon, d'un castor, d'un dromadaire, d'un ours, et d'un gazelle.* Paris, Frederic Leonard, 1669. A chameleon is pictured on Plate I; the upper portion shows the skeletal system in which the cranial cavity is clearly seen.

135 *H.A.*, II, 12; 503 b 20. He describes respiratory and other movements after the creature is cut open.

philosophical phenomena in a biological fashion,[136] it is beyond need of proof that he viewed biological phenomena from a philosophical standpoint.

Thus it could be argued that when dealing with the location of the brain, he is reasoning *a priori,* a technique which Lewes[137] and others often accuse Aristotle of using in his scientific writings. As Karsch[138] has suggested, he may have argued that as hearing is made possible by air, thus, just as he had found the element water in the eye and in the brain, he must now find air in the head. He therefore invented the occipital space for the needs of his theory of hearing. In other words, he was led to his assertions concerning the occipital space by theoretical considerations only.[139] On the other hand, it would be possible to suggest that Aristotle's assertions which have been discussed could have been the product of some thought process or belief of which we now have no trace.

But it seems that neither the empirical nor the purely speculative approach explains adequately all aspects of the problem, and that a combination of the two is a more satisfactory conclusion. Thus it is suggested that to the knowledge of the human brain handed down to him by his predecessors, Aristotle added a complexity of observational data derived from the dissection of lower animals and in particular perhaps from reptiles such as the turtle and the chameleon and from fish. He was then able to interpret this evidence according to his philosophical requirements so that they fitted into the closely reasoned theory of brain and special sense organ function. As he indicates, structural details are of less importance in themselves than the relation of such parts to the total form, for they have no independent existence. Anatomical errors were therefore of less significance to him than to the modern biologist and they did not necessarily interfere with his general thesis.

This attempt to reconstruct Aristotle's thought processes is made with the full knowledge that such a practice is singularly hazardous, and also with the realization that those who indulge in it may discover that instead of following Aristotle's line of argument as they intend, they are, in fact, following their own.

136 Randall (*op. cit.* [note 28], p. 224) has recently stressed the biological motivations of Aristotle's thought, and he takes into account the similar conclusions of Thompson (*op. cit.* [Note 81], p. 80). Peck (*op. cit.* [note 44], p. 1), and Hantz (H. D. Hantz, *The biological motivation in Aristotle.* New York, Columbia University [Ph.D. Thesis], 1939).

137 *Op. cit.* (note 48).

138 *Op. cit.* (note 38), p. 54.

139 One could perhaps argue that at times Aristotle's philosophy dictated his physiology (*P.A.*, II, 7; 653 b 3).

UNIVERSITY OF MICHIGAN LIBRARIES

ALBERT DEUTSCH
1905-1961

Allan Roos, 1958

Albert Deutsch: The Historian as Social Reformer

JEANNE L. BRAND*

THE sudden death of Albert Deutsch on 18 June 1961, during his participation in a mental health research conference in England, ended the career of a remarkable man. Medical and social welfare historians knew him best through his history of *The Mentally Ill in America,* through his work on behalf of the American Association for the History of Medicine in *One Hundred Years of American Psychiatry,* and for his jointly authored *History of Public Welfare in New York State.*[1] To thousands of New Yorkers and other Americans he will be remembered for his dynamic daily health and welfare columns in the newspaper *PM* from 1941 to 1948. Social workers, penologists, and many state legislators will best recall his scoring indictments of the nation's handling of juvenile delinquents and others who came into conflict with the law.[2] The psychiatric profession, which had both winced at and acclaimed his impeachment of America's care of the insane, in 1958 was to award him its highest honor for a layman: election as an Honorary Fellow of the American Psychiatric Association.

Behind the development of this warm, vital, and many-sided man lies an interesting story. Born in the slum area of New York's lower East Side on 23 October 1905, Albert Deutsch was the first child to be born in America of a family which had emigrated from Latvia in 1904. The fourth of nine brothers and sisters, his childhood was spent in harsh poverty. At the age of five, while playing with a group of children in the street, his right eye was pierced by broken glass, necessitating enucleation. This rarely mentioned experience, at so early an age, nevertheless had an inevitable effect on his development. In time, the surfaces of the wound healed, and the young child returned from a crowded city hospital to the warm family surroundings and grew in the rough and

* Washington, D. C.

1 Albert Deutsch, *The mentally ill in America, A history of their care and treatment from colonial times,* New York, Doubleday Doran Co., Inc., 1937; J. K. Hall, Ed., *One hundred years of American psychiatry,* New York, Columbia University Press, 1944; David M. Schneider and Albert Deutsch, *The history of public welfare in New York State, 1867-1940,* Chicago, The University of Chicago Press, 1941.

2 Deutsch, *Our rejected children,* Boston, Little, Brown & Co., 1950; *The trouble with cops,* New York, Crown Publishers, 1955.

tumble of a large family. But there had already been born that divergent combination of inexorable, self-preserving independence in human relations joined with a deep sympathy for the adversities of others.

The young Albert, endowed with a lively intelligence and insatiable curiosity, found the world of books early. His oldest sister, Mrs. Rose Kastner, remembers the young boy as reading constantly, at meals and late into the night. As the new world of the mind widened, he was to spend long hours in New York libraries reading biography and history. Books alone, though, did not satisfy the energy or stifle his rebellion against the deprivation and inequities of the world in which he grew. And so, before completing high school he left his family and started off on a period of adventure and exploration, of odd jobs and much travel, which was to last for a number of years. For a time, he worked as a longshoreman on New Orleans' docks, as a farmhand in Georgia peach fields, and as a shipyard worker in California. By the late 1920's he was playing bit parts in West Coast theatre groups. His infectious wit, warm smile, and that mature acceptance of human foibles, which so often develops early in children of large families, made him a welcome guest in a variety of social groups.

These were years of wandering, but also years which gave him a wide acquaintance with all sorts and conditions of men, a deep understanding of many areas of life. Wherever he went, he sought out the public libraries and continued his self-education, aided by a highly retentive memory. Withal, he carried with him his fundamental idealism and a capacity for enjoying life, while at the same time recognizing its sorrows and injustices. Even in these years of drifting there was developing the man who was to write in 1949:

> I consider myself an optimist, and I love life. If I have frequently attacked conditions I regard as evil, it is only because I would like to see everyone get a chance at the wonderful variety of pleasing experiences that our marvellously rich society affords—potentially. The basic tragedy of our time, it has seemed to me, is that we should tolerate so much misery, friction and unhappiness when there is a potential abundance that all could share in peace.[3]

But the potential reformer had not yet found a cause around which he could concentrate his energies. When he returned to New York, the carefree 1920's had been swallowed in the Depression, and jobs were scarce. It was the era of college gradu-

[3] *Daily Compass,* 12 August 1949.

ates selling apples on the street corners. His varied experiences included some hack research and writing for encyclopedias. By 1934 he was at work on a New York City welfare project, drawing $15.00 weekly for surveying old documents of the New York State Department of Welfare to obtain material for a history of that department. Among them were historical records on the public care of mental patients. He found the subject absorbing, and it was a story which his collateral research at the great New York Public Library at 42nd Street made him realize had never been written.

His initiative and imagination led him to seek out the National Committee for Mental Hygiene and Clifford Beers, founder of the mental hygiene movement in this country. After he produced several write-ups of some of the materials he had found, Beers and H. Edmund Bullis, then Executive Officer both of the National Committee and the American Foundation for Mental Hygiene, agreed to pay him $2,500 for a year's work on the manuscript, which afterwards was to become *The Mentally Ill in America.*

Deutsch worked day and night, ceaselessly; the book took two years, and a second $2,500. The copyright was held by the American Foundation for Mental Hygiene, and he received no royalties. But it was to be the turning point in his career. From the time of its publication in 1937, his reputation as a writer and as an historian of social psychiatry was made.[4] Lewis Gannett, writing in the *New York Herald Tribune,* hailed the study as "an inspiring report of progress achieved, and an appalling vista of problems unsolved."[5] C.-E. A. Winslow, in the *American Journal of Public Health,* stated: "Such a scholarly review as this has long been needed and it will form part of all our thinking in regard to the vital public health problems with which it deals."[6] The *Saturday Review of Literature* noted the tremendous amount of research, clear writing, and called it "social history of the first order."[7]

The Mentally Ill in America was a remarkable book, the more so in a period where the Ph.D. had already become the "union card" for qualification as a "scholar" (however slight, in some

[4] This account of the start of *The mentally ill in America* is based in part on information given to the author by Mr. Deutsch, and more specifically on a letter of 1 November 1961 which Colonel Bullis kindly wrote to the author. Albert Deutsch published several scholarly articles in 1936 based upon portions of the book including "Dorothea Lynde Dix: Apostle of the Insane," *Amer. J. Nurs.,* 1936, *36,* 987-997; and "The cult of curability, its rise and decline," *Amer. J. Psychiat.,* 1936, *92,* 1261-1280.

[5] *New York Herald Tribune,* 20 May 1937.

[6] *Amer. J. Publ. Hlth,* 1937, *27,* p. 847.

[7] *Sat. Rev. Lit.,* 1937, *16,* 24 July, p. 10.

cases, the final, qualifying research product might be). Yet here was a study of intellectual breadth, of sound, meticulous scholarship based on primary sources, written in a felicitous style, by a man with no university training. If he had written no other history, this book alone would qualify him as an historian.

In 1936 the New York State Department of Welfare employed him as a Research Associate, and he was to remain there until 1940. During these years he wrote, with David Schneider, *The History of Public Welfare in New York State, 1867-1940.* His reading and interest in the history of medicine continued. Together with Gregory Zilboorg, Victor Robinson, and George Rosen, in 1938 he was elected to membership in the newly formed "Innominate Club" (later to become the New York Society for the History of Medicine), and contributed a variety of papers on the history of psychiatry, Colonial medicine, and (significantly) one on "Historical Inter-Relationships of Medicine and Social Welfare."[8] To the close of his life, Albert Deutsch carried a deep respect for the broad erudition of such historians of medicine as Zilboorg, Owsei Temkin, and George Rosen. He recognized the limits which his lack of formal medical education placed on his work in medical history. But the area of his deepest historical interest was that still uncharted historical territory where medicine and society meet—medical-social history.

History had been a deeply satisfying pursuit in its own right for Deutsch. But for him it was also a tool to better the present. He had prefaced *The History of Public Welfare in New York State* with Santayana's phrase, "Those who cannot remember the past are condemned to repeat it." And when, in 1941, Ralph Ingersoll, the founder of *PM*, asked Deutsch to write a daily column for the paper, the historian gave birth to the social reformer, the crusading journalist. He had already published a number of articles on current social welfare problems. Now he had in hand a personal daily vehicle to combat public apathy and the overt iniquities in health and welfare programs. His opening column on 23 April 1941 was a rousing defense against criticism levied at New York City social workers. By early May he was deep in a plea for the extension of government support for medical care:

> The medical care of the indigent should be placed on a secure and respectable basis, no longer a matter of private philanthropy but of a public right purchased out of a common fund. . . . Education of the poor started

[8] Deutsch, "Historical inter-relationships between medicine and social welfare," *Bull. Hist. Med.*, 1942, *11*, 485-502.

as a private charity and ended as a public service; the people have as much right to health as they have to education.[9]

As the months and years went by, the depth and range of his articles grew as did the urgency of his message for social betterment—for the care of the aged, better venereal disease control measures in the Army, the need for birth control, the elimination of "kickback" in medical fees, health insurance, reactionary policies of the American Medical Association, and many other subjects. When he found sound health and welfare programs, he gave warm support to those responsible for their administration. Very early he praised the activities of the U. S. Public Health Service and its newly constituted medical research programs in the [then] National Institute of Health.[10] His reforming efforts were also tempered with discretion. In 1943 when he learned of barbarous incidents of mentally disturbed soldiers being brought back from overseas in wire cages, he took the story to the War Department for security clearance. It was never published, but the practice ceased.[11]

At one point, irate over such fear slogans adopted by fund-raising campaigns of some health agencies as that one out of every eight Americans dies of cancer, one out of three of heart disease, he was to note bluntly in his column: "When the whole grim truth is told, one out of every one of us dies."

In 1944 he started to collect materials for a survey of psychiatric facilities in veterans hospitals. When *PM* started to publish his findings of maltreatment, the House Committee on Veterans Affairs, headed by the Mississippi Representative, John E. Rankin, demanded that he name those VA physicians who had given him the material for the stories. He refused, calling on the historic privilege of the fourth estate, and the House Committee started contempt proceedings against him. Violent and immediate protests arose in newspapers all over the country in defense of Deutsch and the freedom of the press. Drew Pearson broadcast in his support. Eleven days later the Committee rescinded its contempt charges.[12] And, as he wrote not long afterwards, "I experienced the satisfaction of seeing the old guard in the Veterans Administration deposed by the President, and the VA medical program drastically reorganized by General Omar Bradley."[13]

[9] *PM*, 6 May 1941, p. 9.
[10] *PM*, 11 July 1941, p. 11 and 14 July 1941, p. 13.
[11] *Time*, 9 Aug. 1948, p. 42.
[12] *New York Times*, 19 May 1945; 30 May 1945; *PM*, 20, 21 May 1945.
[13] Deutsch, *The shame of the states*, New York, Harcourt Brace, 1948, preface, p. 11.

He must also have been heartened by the recognition given him for his work by his colleagues. In 1945 and 1946, the American Newspaper Guild's Heywood Broun Award Committee gave him special citations for his series of articles on veterans hospitals and mental hospitals. In 1947 the New York Newspaper Guild honored him for "the most distinguished and effective humanitarian crusading in American journalism."

At the age of 27 he had married. For those who came to know him well it was understandable that the roving role of the reporter, combined with problems in relating closely to people, were hazardous portents for any marriage. There were no children, and the marriage was later to terminate in divorce.

Although journalism increasingly took a large share of his time in the mid-1940's, he nevertheless continued his historical interests. In 1941, together with Henry Sigerist, Gregory Zilboorg, and Richard Shryock, he was designated to represent the American Association for the History of Medicine in the preparation of a history of American psychiatry for presentation at the Centenary Meeting of the American Psychiatric Association. To this volume, published in 1944, he contributed two chapters on military psychiatry during the Civil War and during World War II.

These were also years of widening contacts with the medical world, of association with the Young Turks' movement in psychiatry (formed in 1946 as the Group for the Advancement of Psychiatry),[14] and of growth in many areas. It was through the preparation of a series of articles on mental hospitals for *PM*, however, that there grew the book which finally was published as *The Shame of the States*. He had already sounded a reformer's challenge in the last chapter of *The Mentally Ill in America* with the words:

> We have travelled a long road from the ideal of repression to the ideal of prevention, from manacles to mental hygiene. But the contemplation of past triumphs leaves no room for a complacent attitude toward present conditions. Progress is achieved not by the philosophy of "things have been worse," but by the philosophy founded on the premise that "conditions could be made better."[15]

Now, in *The Shame of the States* (whose title so closely paralleled the exposé of that other great journalist-reformer, Lincoln

[14] In 1959, the Group for the Advancement of Psychiatry, on whose Committee on Psychopathology he had served for a number of years, asked Deutsch to prepare a brief history of the organization. (Deutsch, *The story of GAP*, New York, Group for the Advancement of Psychiatry, 1959.)

[15] Deutsch, *The mentally ill in America*, p. 518.

Steffen's *Shame of the Cities*), Deutsch delivered a powerful indictment of state hospital care of American mental patients. The depth of his feeling spoke in the preface:

> Etched deep in my own heart and mind are the many pitiable scenes I witnessed on the wards of mental hospitals during my survey. I shall never forget them. And so long as these poignant memories remain, I shall continue to be a part of the movement for civilized, humane and scientific treatment of those who cannot speak for themselves.[16]

For the most part, state hospital officials welcomed him, aware of the help in combatting social inertia and tight purse-strings of state legislators which his exposures could bring. As he pointed out at the time the book was issued, not a *single* state mental hospital in the United States met even the minimum standards set by the American Psychiatric Association in all major aspects of care and treatment. How close to the scenes Dorothea Dix had witnessed were the conditions he found in such institutions as Pennsylvania's Byberry Hospital: "I entered buildings swarming with naked humans herded like cattle and treated with less concern. . . . Winter or summer these creatures never were given any clothing at all. Some lay about on the bare floor in their own excreta."[17]

Deutsch presented these picture-documented scenes with the sentence: "Could a truly civilized community permit humans to be reduced to such animal-like level?" The articles and the subsequent book shocked many communities into an examination of their state mental institutions, and reforms followed. The following year he was given the Lasker Award "for public information leading to public action, and for his outstanding contribution to the advancement of mental health through his journalistic efforts."

When *PM* closed, he continued his columns in the *New York Star* and its successor, the *Daily Compass*. But in 1949 he ceased his daily newspaper work. His farewell column carried some of his philosophy:

> I have always been a rebel, and I hope I shall always remain so. My soul has been my own, unchained to any dogma or outside owner. . . . When I had occasion to expose social evils, I always sought to condemn the tolerated institution or condition rather than the particular individual involved in its operation. I know what terrible injustices have been wrought in the periodic sacrifice on the altar of social neglect, indifference, and perversity. But I have not hesitated to attack individuals when I believed they were inseparably tied up with socially undesirable conditions.[18]

[16] Deutsch, *The shame of the states*, pp. 13-14.
[17] *Ibid.*, pp. 42 and 49.
[18] *Daily Compass*, 12 Aug. 1949.

Part of his reason for leaving newspaper work was his desire to explore social problems more deeply than a newspaper column permitted. His reputation as a writer had already opened the magazine world, and during the next seven to eight years he prepared a variety of articles on health and welfare subjects. In 1950, he published *Our Rejected Children,* a book on juvenile delinquency which grew out of a series of articles written from 1947-1950. He was later to testify before a Senate Subcommittee to Investigate Juvenile Delinquency on the shockingly low caliber of those who staffed many American institutions for juvenile delinquents. In 1953 he was presented with the Adolf Meyer Memorial Award in Mental Hygiene.

In 1955 he brought out another crusading book, this time on the need for police reform: *The Trouble With Cops.*[19] He described it as a journalistic inquiry into present-day local police work.

During these years devoted to article writing, he was divorced, moved from New York to Washington, and developed severe glaucoma in his remaining eye. Nevertheless, his professional activities with groups such as the American Orthopsychiatric Association, the National Conference on Social Welfare, American Psychiatric Association, the American Public Health Association, and a variety of other organizations continued. He was also invited with increasing frequency to give lectures and to participate in seminars on mental health problems. Although he devoted less time to medical history as such, he delighted to gather with those working in the field. A member of the Committee on the History of Social Welfare, he presented a scholarly paper on the "Deserving and Undeserving Poor," during the 1958 meetings of the American Historical Association. He also took part in the newly formed Washington Society for the History of Medicine during the last year of his life.

In June 1956, under a grant from the National Association for Mental Health, he started on the book which he did not live to complete—a survey of mental health research in the United States. At the outset he had planned it as a frankly impressionistic report, based on visits to fifteen or twenty research centers. As the months went by, the complexity of the over-all subject, the great range of research in mental health fields, from biochemical and genetic to socio-environmental and psychoanalytic approaches to the causes,

19 Deutsch, *The trouble with cops,* New York, Crown Publishers, 1955.

therapies, and prevention of mental illness, made him realize deeper study was necessary. In 1958 and 1959 the National Institute of Mental Health awarded him additional funds for the project. But the task was not to be completed. His death from a heart attack came during a two weeks' international research conference convened at Roffey Park, England, by the World Federation for Mental Health.

Albert Deutsch was a man, the fulfillment of whose deepest needs inevitably led him to "causes," to attempting to right some of the fundamental injustices of life. It is axiomatic that the well-springs of reformers often lie in their own early sufferings and subsequent identification with the under-dog. Less often does one appear who is also capable of writing sound, objective history. Nor is the historian, who so frequently detaches from the world in the role of the observer, often attracted to social reform. It was also a part both of the depth of his perception as well as his own maturation that he was ultimately drawn so closely into the field of mental health, and to the potential contributions to society's betterment which psychiatric understanding offers.

Over the years he developed within himself in high degree some of those ethical qualities upon which the best of man is built—a warm interest in and concern for his fellow man; balanced judgment; a kindly patience with human frailties, but a remarkable courage and stamina to fight against injustice, particularly for those too vulnerable to fight for themselves; a total freedom from malice or pettiness. Among the hundreds of friends in psychiatry and social welfare whom he left behind, there are few who will ever forget his humor and charm.

ACKNOWLEDGMENTS

I should like to acknowledge the kindness of Mrs. Rose Kastner, Mr. Deutsch's sister, for additional information on his youth; Dr. Julius Schreiber, President of the Albert Deutsch Memorial Foundation, who generously made available a collection of Albert's columns and articles; and Dr. Iago Galdston and staff of the New York Academy of Medicine for locating information on the activities of the now extinct New York Society for the History of Medicine.

Prohibition and Eugenics 1920-1933

BARTLETT C. JONES*

. . . the Eighteenth Amendment, if it really prohibits, is the most tremendous 'eugenic law' ever passed in the world's history, because it will profoundly influence the health, sanity, and stamina of generations yet unborn.

Some biologists believe it will weaken the race, because they believe alcohol has for ages killed off the weaklings and those lacking self-control; and that if such persons are permitted to live and reproduce and spread their inborn weakness, in time the whole race will become potential drunkards. Other biologists believe that counteracting factors will prevent this disaster. I shall not enter the controversy here. But I cite it as a tremendous eugenical problem, which is also a political problem.

Albert E. Wiggam (1924)

For at least thirty years prior to 1920, the effects of alcohol on human beings and animals had been studied intensively by outstanding western scientists.[1] Any conclusions concerning the impact of alcoholic beverages on racial stocks were of great interest to sociologists, geneticists, eugenists, and political theorists. Race protection and improvement were subjects of popular concern. Such doctrines as the "yellow peril" and Anglo-Saxon supremacy were widely debated. At fairs, agents of the "Better Babies" movement in Iowa and the "Fitter Families for Future Firesides" group in Kansas judged people, rather than animals, to determine superior breeds. Prohibition, not surprisingly, was both defended and attacked in terms of its presumed effect on the racial development of the United States.

Some of the arguments were after the fact and relatively naïve. Drys claimed that current evils and the decline of previous civilizations were caused by the consumption of alcoholic beverages. Dr. D. H. Kress, Vice President, American Medical Society for the Study of Alcohol and Other Narcotics, commented:

Babylon's downfall was due to drink. It was the prevalent use of intoxicants which afterward resulted in the disintegration and downfall of the Medo-Persian Empire. The same causes resulted in the collapse of Greece and Rome.[2]

* Sam Houston State Teachers College, Huntsville, Texas.

1 See S. J. Holmes, *A bibliography of eugenics*, University of California Publications in Zoology, XXV. Berkeley, 1924, pp. 185-208.

2 D. H. Kress, "Wine and beer—their use from a historic and scientific standpoint," in *World League Against Alcoholism, Int. Conv.*, 1st, Toronto, 1922, Westerville, Ohio, 1923 (?), p. 271.

Kress saw indications of serious decay in France, Great Britain, and Germany during the twentieth century. Although he took political and social factors into account, he emphasized an alleged relationship between alcoholism and racial degeneracy. Wets replied that the white race had advanced far beyond the peoples who traditionally prohibited, or eschewed, alcoholic beverages. A Congressman from Wisconsin insisted that one of history's simplest lessons was the relatively progressive nature of the "drinking races." He alluded triumphantly to a "handful of beer and ale drinking Englishmen holding in subjection 300,000,000 Hindu teetotalers."[3] Hudson Maxim, an inventor of smokeless powder and other innovations in the munitions field, condemned Mohammed, whose teachings had imposed prohibition upon so many hundred million people, and observed, "These Mohammedans are the underwhelms of the world, with which the white race plays battledore and shuttlecock."[4]

The debate was dominated, however, by persons with a more rigorously scientific orientation. Occasionally, their arguments became quite abstruse, but the broad outlines of the eugenical discussion remained clear. Drys relied on the doctrines of the inheritance of acquired characteristics, in modified form. Some drys admitted that the children of amputees had offspring with normal appendages, but distinguished between inflicted characteristics, such as mutilations or amputations, and characteristics which resulted from functional processes, like drinking alcoholic beverages. Some statements of this general position were cited by Emma L. Transeau, Research Secretary of the Scientific Temperance Federation, to "show the trend of thought toward the hopeful possibility of at least some degree of race improvement by right living."[5]

The wet refutations fall into three general groups. The available evidence, it was argued, did not prove hereditary alcoholic damage. This view added to doctrines of selective improvement, which held that alcohol tended to eliminate the unfit, was another wet argument. And alcoholic selection, combined with the theory of hereditary alcoholic damage, became the wet eugenists' major criticism of Prohibition.

[3] U.S. Congress. Senate. Committee on the Judiciary, *The national prohibition law.* Hearings before the Subcommittee . . . sixty-ninth congress, first session, on . . . bills to amend the national prohibition act, April 5 to 24, 1926. Washington, 1926, I, p. 626.

[4] *Ibid.*, p. 167.

[5] Emma L. Transeau, "The eugenic pendulum swings," *Sci. Temp. J.*, 1921, *30*, 210.

Drys made use of scientific studies which alleged that alcoholic consumption harmed the race, not merely because individuals were impaired, but because alcoholic damage was passed to the drinker's descendants, causing degeneracy, deformity, and mental deficiency. An excellent example of this position is the following poster, which was sold for classroom use by the National Education Association:

> IT'S THE RACE THAT COUNTS
>
> Love of home and the desire for fine children have been strong among all the great civilized peoples of history. Even young folks are deeply moved by these powerful ideals. Alcohol strikes at the very foundation of racial advance. Laboratory experiments have taught us that even small doses of alcohol attack the most highly developed cells of the body—the brain, the nerves, the racial cells of procreation. These creative cells in alcoholic parents—if not completely destroyed—are degenerated and the child suffers the fatal consequences even before birth. The children of drinking parents show a strong tendency toward weakened mentality—there are more idiots and inferior individuals among them. It is even probable that the germ plasm itself —that vital spark which continues on thru countless centuries—is so affected by alcohol that the children for generations to come suffer from the sins of the fathers. It is the race that counts and alcohol is an enemy of its advance.—Doctor K. Herman Bouman, noted Dutch scientist and psychiatrist, University of Amsterdam, Holland.[6]

Alcohol was therefore a racial poison, which damaged the substance of heredity, the germ plasm. A comprehensive statement of this position, citing numerous scientific experiments, was included in a major dry publication, the six-volume *Standard Encyclopedia of the Alcohol Problem.*[7]

When drys spoke of racial poisons, they were often popularizing Dr. C. W. Saleeby, a British eugenist. Saleeby wrote extensively on this subject, participated in numerous conferences against alcoholism, and made a speaking tour of the United States under the auspices of the Anti-Saloon League. Certain drys acknowledged that Saleeby had strongly influenced their views on the liquor question.[8] In 1922, for instance, Saleeby cited an Ameri-

6 "It's the race that counts," *J. nat. Educ. Ass.*, 1931, *20*, 127.

7 "Alcohol and heredity," *Standard encyclopedia of the alcohol problem*, Westerville, Ohio, 1925, I, pp. 118-124.

8 S. S. Wise, "Judaism in America in the movement against alcohol," in *Int. Congr. Against Alcoholism, Proceedings*, 15th, *Washington, 1920*, Washington, 1921, p. 225. Also R. P. Hobson, "Address by the Hon. Richmond Pearson Hobson," in *ibid.*, 240-241. Saleeby's speaking tour was reported in a popular magazine, which commented, "Prohibition takes on new dimensions as viewed from such an angle . . ." See "Alcoholism and parenthood," *Survey*, 1921, *45*, 86.

can experimenter on guinea pigs, a Swiss autopsy study, and a Norwegian genealogical investigation to prove that "this poisoning of the race, of the germ plasm, is the worst thing alcohol does against mankind."[9]

A conflict of opinion concerning the action of racial poisons was clarified by Professor Thurman B. Rice, Chairman of the Indiana Eugenics Committee, who wrote:

> In the original form of the theory of racial poisons it was set forth that certain diseases and poisons may injure the germ plasm by poisoning the soma, or body. The origin of a major portion of the defectiveness of the race was ascribed without sufficient evidence to this source. Doubtless the reasoning was carried too far, but that is not ground for discarding the idea of racial poisons entirely. . . . Indeed there is good reason to believe . . . that . . . alcohol and lead may injure the germ cells not *through* the body cells, but *along with and in the same way* that they injure the other cells of the body.[10]

This was, however, a peripheral question. Wets and drys were primarily concerned with the truth or falsity of alleged alcoholic damage to the germ plasm. The way in which the change took place was of secondary importance.

The difference between individual and racial poisoning was emphasized by two prominent drys:

> Admitted, however, that liquors sold today are even more poisonous than before prohibition, it nevertheless is true that they are not the menace that they were. It is not the individual poisoning which constitutes the chief menace of alcohol. It is the chronic and racial poisoning which strikes at the root of future generations and lowers the level of citizenship. Better hundreds sent to their graves by wood alcohol which they were under no compulsion to drink rather than millions cut short of their full possibilities by alcohol which perhaps they themselves never drank at all.[11]

Alcoholism itself was held to be an inherited trait. Roger Babson, better known for economic than genetic analysis, stated this doctrine when he wrote: "As the use of liquor tends to be hereditary, parents using it do a great wrong to their children, especially if they have boys, and . . . may have developed a harmful influence on several generations to follow."[12] A fictional reformer regretted that the heroine indulged "her inherited taste for alcohol."[13]

[9] C. W. Saleeby, "'Guard your race.' Address on eugenics and prohibition," *Convention* (note 2), 97-98.

[10] T. B. Rice, *Racial hygiene*, New York, 1929, p. 175.

[11] C. T. Wilson and Deets Pickett, *The case for prohibition*, New York, 1923, pp. 79-80.

[12] R. W. Babson, "Business and prohibition," reprinted in *Anti-Saloon League Year Book*, 1926, p. 24.

[13] Royce Brier, *Crusade*, New York, 1931, p. 44.

Although the wets were placed on the defensive by the dry eugenists, at least two outstanding scientists questioned and criticized the view that alcohol caused hereditary damage to racial stocks. Samuel J. Holmes, a zoologist at the University of California, pointed out many difficulties in deducing a relationship between alcohol and heredity on the basis of evidence accumulated to that time. He complained, "The subject is seldom discussed without bias, and most of our data has been collected by writers who were endeavoring to make the case against alcohol as bad as it could be made."[14] If alcoholism ran in families, environmental factors might be no less important than hereditary ones. Holmes dismissed this problem in the following manner:

> Nothing is more common than to find statistics regarding the appearance of alcoholism in successive generations adduced as a sufficient proof of the hereditary effects of alcohol. One might get the same kind of statistics about taking snuff, chewing tobacco or using bad grammar, but they would prove nothing in respect to hereditary transmission.[15]

Concerning the relationship between alcoholism and degeneracy, he wrote:

> The Jukes, the Tribe of Ishmael, the Kallikak family, the Zero family and the Nam family all have much the same melancholy sort of history. All show alcoholism and degeneracy going hand in hand. It is reasonably certain that much alcoholism is the product of degeneration. That it is a common cause of the first appearance of degenerate strains is of course possible, if not probable. But our present knowledge of the subject does not justify us in asserting that such a conclusion is anything more than a good working hypothesis.[16]

Holmes, in discrediting the extreme statements concerning the adverse effects of alcohol on the race, served the wet cause, whether purposely or not.

Dr. Henry H. Goddard, perhaps best known for his study of the Kallikak family, applied Holmes' approach in the following manner:

> In considering the question of whether alcohol causes feeble-mindedness we ought to consider the cases of normal children with alcoholic parents in otherwise normal families. While we have at hand no statistics on this subject every one knows that there are many such cases. Indeed one must admit the argument that if alcohol did cause feeble-mindedness, the number of the feeble-minded would be enormously greater than it now is. Even to-day there are cases of severely alcoholic parents with families of children none of whom are feeble-minded; and if we go back two or three genera-

[14] S. J. Holmes, *The trend of the race,* New York, 1921, p. 277.
[15] *Ibid.,* p. 278.
[16] *Ibid.,* p. 290.

tions, when it was much more common for intelligent people to get intoxicated than it is to-day, we see how unlikely it is that alcoholism could be a serious cause of feeble-mindedness, else a large proportion of the population would be defective.

Since the definition of alcoholic as used in our work is practically synonymous with drunkard, the argument is heightened.

If it cannot be shown that drunken parents more certainly have feeble-minded children, it is hardly worth while to discuss the cases of moderate drinkers or even the habitual drinkers who never drank to intoxication.

Everything seems to indicate that alcoholism itself is only a symptom, that it for the most part occurs in families where there is some form of neurotic taint, especially feeble-mindedness. The percentage of our alcoholics that are also feeble-minded is very great. Indeed one may say without fear of dispute that more people are alcoholic because they are feeble-minded than vice versa.[17]

Some known wets argued that alcoholic excesses were merely effects of degeneracy or inadequacy. An article stated this view succinctly: " . . . the ability on the part of man to use alcohol temperately and wisely is the sign of good stock; the inability to use it even moderately is evidence of a constitutional instability."[18] Professor Raymond Pearl's *Alcohol and Longevity* ends with a quotation stating that alcohol was poison only to weaklings.[19]

Drys, however, denied that any individual, regardless of racial stock or physical strength, could be trusted to use alcohol moderately.[20] The *Standard Encyclopedia of the Alcohol Problem* reported some observational results "which appeared to show alcoholism antedating any appearance of psychopathic defect."[21] Professor Rice justified this position in the following manner:

The process of cell division as it takes place in the production of the germ cells is extremely complicated, therefore we cannot expect the cells poisoned by alcohol, and poorly nourished because of its systematic effects upon the body to make the accurate cell divisions so essential to the production of normal sperms and eggs. . . . This would appear to explain, at least in some cases, the origin of bad or defective strains. . . . The theoretical outcome of such products of defective germs is appalling to contemplate. It seems entirely possible that such may have been the origin of the human cesspools which have come to be known as the Jukes, the Nams, the Zeros and other infamous families. The work of Stockard seems to indicate clearly that alcoholism of the parents (guinea pigs) caused abnormal offspring in later generations.[22]

[17] H. H. Goddard, *Feeble-mindedness: its causes and consequences*, New York, 1923, pp. 491-492.

[18] C. L. Dana, "Nervous and mental diseases and the Volstead Law," *N. Amer. Rev.*, 1925, *221*, 617.

[19] Raymond Pearl, *Alcohol and longevity*, New York, 1926, p. 230.

[20] E. L. Fisk, "The relationship of alcohol to society and citizenship," *Ann. Amer. Acad. polit. soc. Sci.*, 1923, *109*, 4.

[21] *Standard encyclopedia of the alcohol problem*, I, pp. 123-124.

[22] Rice (note 10), p. 177. The view that alcohol could injure sperm is criticized in Goddard (note 17), pp. 474-475.

Some drys, then, called alcohol the cause of inherited deficiencies.

Hobart A. Hare, Professor of Medicine, Jefferson Medical College, Philadelphia, and editor of *The Therapeutic Gazette,* blended the view that alcohol did not have a significant hereditary action with the doctrine of selective improvement to form the following wet argument:

> It is said that alcoholic parents breed more freely than sober ones, and have a greatly increased percentage of degenerate children, and so the conclusion is jumped at that alcoholism produces the degeneracy, when, in most cases, the degeneracy produces the alcoholism. If the parents were not lacking they would not abuse alcohol. If it were true that alcohol always produces a habit to the extent of doing evil to all men, the population of the earth would have disappeared long ago. Millions have used it wisely, instinctively, or intelligently with benefit. Thousands have fallen under its use, but the nice question for us as scientific men to determine is whether in an effort to save the weakling from its abuse we are not preserving a degenerate strain that were better destroyed before it multiplies too far.[23]

Hare, who ridiculed the idea of protecting weaklings, explicitly stated his opposition to Prohibition and its restrictions on medicinal liquor.

In the early twenties, however, the theory of hereditary alcoholic selection became the central issue in eugenical discussions of Prohibition. The initiative passed to the wets when several scientists, working with different animals, popularized the concept of selective improvement in stocks due to the hereditary action of alcohol in eliminating the unfit. Perhaps the most publicized was Dr. Charles R. Stockard of Cornell University Medical College in New York City, who had studied alcoholized guinea pigs. He was invited to address the Fifteenth International Congress Against Alcoholism in 1920, possibly because his experiments showed hereditary alcoholic damage — the basic dry eugenic argument. But Stockard embarrassed his hosts.

He reported that the fourth generation of alcoholized guinea pigs was superior to the first, that alcohol had eliminated the unfit. Despite his belief that "it don't appeal to you people," Stockard offered the following argument:

> There are a certain class of weak mediocre people or individuals who don't seem to amount to anything and you want to take them on your lap . . . and coddle their mediocrity, and humor them, but alcohol, if used in a eugenic way, will prevent such people from even being born. . . .
>
> We can't look at this from an ethical or humanitarian standpoint; we've got to consider it on a scientific basis. If you go to breed horses or

[23] H. A. Hare, "A lecture on alcohol and its use in medicine," *Ther. Gaz.,* 1925, *49,* 20.

dogs or cattle or pigs or any of those things, you must, and do, go at it scientifically. If you don't do that soon . . . we shall eventually go even below the level of mediocrity; and that is not what you want to do to the human race.[24]

The drys began their rebuttal immediately. One rose "to say a few words to prevent any enemy of our cause" from using some of Stockard's statistics. He argued that it was desirable to protect a few useless individuals to save many normal ones from harm. C. W. Saleeby, the acknowledged formulator and leading proponent of racial poison theory, raised several objections. Primary was the argument that syphilis, like alcohol, eliminated the unfit; but no one "would favor syphilis . . . just to exterminate defectives."[25] Richmond Pearson Hobson, war hero, Congressman, notable popularizer of dry eugenics, asked some methodological questions.[26]

Stockard, however, made his studies of hereditary alcoholic selection familiar to the scientific community. In 1922, he reported:

This selection finally brings out a group of unusually strong specimens from which all the weaklings have been eliminated. . . .

Should one desire to apply these experimental results to the human alcohol problem, it might be claimed that some such elimination of unfit individuals had benefited the races of Europe, since all of the dominant races have a definitely alcoholic history. . . .[27]

Two years later, Stockard confirmed his findings that the descendants of alcoholized guinea pigs were superior to the unalcoholized control group. He also condemned interference with the natural elimination of the unfit:

The wild races of man evolved in a selective environment and the cripples and defectives were not generally carried by the tribe. Civilization has tended to remove the agencies of severe selection and has sought to protect individuals from original sources of natural elimination. . . . Are we always to continue these practices? I doubt very much that they will be continued when the necessary available food becomes a world question. . . . Certainly the burden on the community of providing for individuals who are actually harmful to it . . . will become more and more intolerable. . . .[28]

Relating his results to human beings, he wrote:

[24] C. R. Stockard, "Latest scientific investigation in America of the action of alcohol," in *Proceedings* (note 8), p. 375.

[25] "Discussion," in *ibid.*, p. 378.

[26] *Ibid.*, p. 380.

[27] C. R. Stockard, "Alcohol as a selective agent in the improvement of racial stock," *Brit. med. J.*, 1922, *2*, 258.

[28] C. R. Stockard, "Alcohol a factor in eliminating racial degeneracy," *Amer. J. med. Sci.*, 1924, *167*, 476.

It is highly improbable that human beings have ever injured or eliminated their normal resistant germ-cells with alcohol. Alcohol probably has eliminated some of the bad. Those nations of men that have used the strongest alcoholic beverages through many generations have now, from a standpoint of performance and modern accomplishments, outstripped the other nations with less alcoholism in their history. This may be due to some such selective effects as those recorded in the foregoing pages.[29]

If alcoholic consumption eliminated unfit human beings who should have been eliminated for the good of the race, then it was logical for the America of the twenties to conclude that Prohibition hurt the race. Stockard did not go that far, but both wets and drys took account of his work.

William Jennings Bryan, who had attended the conference against alcoholism which Stockard addressed, later cited Stockard's speech when singling out the most dangerous, inhumane tendencies in Darwinism.[30] The *Journal of the American Medical Association* had this to say concerning Stockard's application of his experimental results to the history of man:

Such extreme generalizations in fields where many agencies of man and nature may cooperate or conflict in the course of the centuries can scarcely be claimed to abide within the range of exact science or even fully warranted hypothesis.[31]

The prominent Yale economist, Irving Fisher, noted Stockard's conclusions, but did not attempt to refute them.[32] Stockard's prestige may explain the fact that he was cited by drys all through the Prohibition era to prove their contention that alcohol caused hereditary damage to racial stocks.[33] Some of these drys omitted mention of Stockard's finding that superior guinea pigs were produced in subsequent generations and his application of these results to man. In other words, drys quoted Stockard to prove hereditary alcoholic damage, but ignored his findings and inferences relating to selective improvement. Only the Research Secretary of the Scientific Temperance Federation set forth Stockard's position in detail and launched a comprehensive attack upon it.

Emma L. Transeau, noting that Stockard's work had been used to attack Prohibition by Samuel Hopkins Adams and an unnamed newspaper writer, raised several objections in four articles. The

29 *Ibid.*, p. 477.

30 W. J. Bryan, *In his image*, New York, 1922, p. 110.

31 "Alcohol and the germ plasm," *J. Amer. med. Ass.*, 1924, *82*, 1444.

32 Irving Fisher, *Prohibition at its worst*, New York, 1927, p. 140 *n.*, and *Prohibition still at its worst*, New York, 1928, p. 239.

33 Saleeby (note 9), p. 97. A volume by the Superintendent, Texas Anti-Saloon League, cited an article by Stockard but omitted Stockard's name. See Atticus Webb, *Dry America*, Nashville, 1931, p. 62.

short-term alcoholic damage was too great to justify the possible long-term improvement. Since the improvement had come only after *"entire freedom from alcohol for four generations after the first treated generation,"* any race betterment through "alcoholic extermination of the unfit would require four generations of prohibition to one of alcoholization, or a tilting of the prohibition lid once in 130 years." And there were further complications:

> Should any one seriously contemplate on the basis of Dr. Stockard's fourth generation guinea pigs, applying the alcoholic weeding process to the human race, other necessary conditions, besides four generations of prohibition, would be: only one alcohol-tainted great-great-grandparent to 15 normal ones, and careful mating of the descendants for at least three generations with strains entirely free from alcoholic ancestry.[34]

Thus, even if Stockard's results could be applied to man, only a lengthy period of Prohibition and an impractical regimentation of human breeding could implement them.

In later rebuttals, Transeau emphasized the problem of litters of varying sizes.[35] The fact that many of the descendants of alcoholics were born in litters of one meant that they didn't have to share nourishment with brothers and sisters. Hence their superiority might have nutritive rather than hereditary explanations. The application of Stockard's results to man was fallacious because

> . . . the conditions which produced the superior pig . . . would be absent, since man does not bring forth his young in litters and provision for the pre-natal development of half a dozen can not in his case be concentrated on one.[36]

She also reported that the so-called superiority of the alcoholized descendants was achieved in litters of two and four, while the normals had a superior record in litters of one, three, and five. Thus the value of alcoholization had to be limited to litters of a certain size. The failure of the alcoholized descendants to produce litters of five was significant "since ability to produce litters of five is a more severe test of racial vigor than is demanded by litters of four."[37]

Despite these criticisms, Stockard's doctrine of hereditary selective elimination continued to be employed by those opposed

[34] Emma L. Transeau, "Stockard's contributions to the study of heredity," *Sci. Temp. J.*, 1921, *30*, 35.

[35] Besides the articles to be cited, see Emma L. Transeau, "Essential factors in the alcohol weeding process," *Sci. Temp. J.*, 1922, *31*, 130.

[36] Emma L. Transeau, "Science speaking on the subject of alcohol," *Sci. Temp. J.*, 1923, *32*, 96.

[37] Emma L. Transeau, "How alcohol 'helps' the fourth generation," *loc. cit.*, p. 85.

to the prohibition of alcoholic beverages. Ernest H. Starling, a physiologist at University College, London, said " . . . the abolition of all alcoholic beverages . . . would be a mistake and contrary to the permanent interest of the race."[38] Starling relied heavily on Stockard to show that such abolition would "help to perpetuate the existence of an inherently unstable stock which would tend to degenerate still further in subsequent generations."[39] An editorial in *The Therapeutic Gazette* made this assessment of Stockard's work:

> At this time when so much effort is being made to protect those who are mentally, nervously and physically unfit from the abuse of alcohol and other drugs this research is of peculiar interest. As has been well said . . . these people are fundamental weaklings, and it is a very grave question as to whether their protection is of actual benefit to the race and whether such efforts do not increase the number of people who have abnormal characteristics.[40]

Stockard had apparently shown that the complete elimination of alcohol "will not be productive of all the good results which some persons have claimed for it." Besides the article by Samuel Hopkins Adams, Stockard's work was reported in at least one other popular magazine. In 1925, an avowed wet cited him as the authority for the view that "the use of alcohol favors the elimination of the unfit, and promotes the improvement of the stock; and that the elimination of alcohol is injurious to the race."[41]

The popularizing process was carried further by Raymond Pearl, a prominent biometrician and research biologist at the Johns Hopkins University, whose *Alcohol and Longevity* appeared in 1926. The book gave currency to wet arguments concerning the effects of alcohol on man, based largely on recent scientific findings. The *New York Herald Tribune* said it placed "the burden of proof on the prohibitionists as never before" and H. L. Mencken gave it an ecstatic review, which gleefully prophesied consternation and confusion throughout "Christian Moronia."[42] A chapter on "The Racial Effect of Alcohol" contained the following conclusions:

38 E. H. Starling, *The action of alcohol on man*, London, 1923, p. v.

39 *Ibid.*, pp. 165-166.

40 "An illuminating research on alcohol," *Ther. Gaz.*, 1924, *48*, 796.

41 Dana (note 18), p. 617. In reporting Stockard's experiments, Samuel Hopkins Adams said that "the burden of proof now rests quite definitely upon the proponents of the 'racial poison' theory." S. H. Adams, "Science has its say about alcohol," *Colliers: The National Weekly*, 7 April 1923, *71*, 6.

42 The *Herald Tribune* was quoted in *The Book Review Digest, Twenty-second Annual Cumulation* (March 1926 to February 1927 inclusive) *Books of 1926*, New York, 1927, p. 557. H. L. Mencken, "The library," *Amer. Mercury*, 1926, *9*, 508-509.

The racial effect of alcohol is preponderantly either beneficial, or at the worst, not harmful. This is true for characters depending upon general vigor in guinea pigs (after early generations are passed), fowls, rats, mice, rabbits, insects, and probably frogs.

This beneficial racial effect appears to be the result primarily of the fact that alcohol acts as a definite, but not too drastic selective agent, both upon germ cells and developing embryos, eliminating the weak and leaving the strong.

Any application of these experimental results to man should be cautiously made, for the following reasons, among others:

The dosage of alcohol is in general much larger in the experimental work with animals than any consumption of alcohol by human beings.

The alcohol is administered in most of the experiments by inhalation, a process which has some very different physiological effects than drinking alcohol in solution.

The guinea pig case shows that some organisms may be quite differently affected racially, for a time at least, by alcohol, than are others. The conclusions drawn from one organism cannot safely be transferred to another in this case.[43]

Pearl, who had personally experimented with alcoholized fowls, thus qualified the laboratory results in certain respects and cautioned against their over-hasty application to the problems of alcohol and human social organization. At least one popular eugenist, however, applied the scientific work on alcoholic selection to the Prohibition question.

Albert E. Wiggam's *The New Decalogue of Science* (1923) argued that the weak should be eliminated in the best interest of the race, but neither alcohol nor Prohibition was mentioned. As scientific work on the selective influence of alcohol became better known, Wiggam took account of it. In 1926, he wrote:

When, for example, men first drank alcohol and a lot of them died, a eugenical alarmist would have prophesied—indeed, some are still prophesying—that the race was done for. However, a closer scrutiny revealed that it was chiefly the weak ones who died. The ones who survived this onslaught were probably of superior physical capacity and mental balance. In short, the race withstood the shock and underwent an evolution to higher levels.[44]

His 1927 volume, *The Next Age of Man,* devoted considerable space to the eugenical aspects of Prohibition and recommended Pearl's *Alcohol and Longevity* to the reading public. Wiggam commented:

[43] Pearl (note 19), pp. 224-225. These conclusions were quoted in a wet polemic, Clarence Darrow and V. S. Yarros, *The prohibition mania,* New York, 1927, pp. 141-142. Pearl's book was essentially a compilation of several articles which had already been popularized to some extent. See Adams (note 4), p. 25.

[44] A. E. Wiggam, "The rising tide of degeneracy," *World's Work,* 1926, *53,* 33.

> No one really knows to-day whether the drinking of alcohol by a parent really affects his offspring or not. But, certainly, what evidence we have practically all tends toward the conviction that alcohol has been an agent—possibly a very considerable agent—in improving man both in his physical constitution and in his intelligence and moral character. . . .
>
> When the old prophets said, "The fool shall perish by his own folly," they probably had been impressed with the fact that a great many weak and foolish individuals drank themselves to death. Had they reflected a little further, it might have occurred to them that nothing better could have happened for the race, especially if the alcohol carried the foolish persons off before they had any children.[45]

This argument was the main prop for Wiggam's contention that "Prohibition is above all a Eugenical question" and "a great social, political and biological mistake."[46]

The scientific finding that alcohol tended to improve the race did not leave the drys without general counter-arguments. Professor Edward A. Ross admitted a modified form of the argument based upon selective elimination. The well-known sociologist, who had been converted to Prohibition by China's experience in opium control, called America's experiment "the device of the young northern peoples to overcome their constitutional handicap in competing with the older and soberer races."[47] He offered statistics which indicated that the peoples of southern Europe, with their long alcoholic history, were better able to use liquor than other ethnic groups which had been exposed for a relatively short time. The basic argument was:

> Once a people has easy access to [alcoholic beverages] it begins to undergo 'alcoholic selection.' Those to whom the delights of intoxication are irresistible sooner or later drink themselves to death or, at any rate, leave a weakened progeny which quickly perish.[48]

America had two alternatives. If she allowed her citizens to use alcoholic beverages, the population, mainly northern peoples, would be severely devastated. There was, however, the future hope that "by the year 2100 A.D. our descendants might be as constitutionally resistant to alcoholic beguilment as are the Portuguese to-day!"[49] Ross favored the other alternative, Prohibition, to avert the ravages of alcoholic selection. While tacitly admitting that a selective agent had been removed from the everyday experience

45 A. E. Wiggam, *The next age of man,* Indianapolis, 1927, pp. 46-47.
46 *Ibid.*, pp. 45, 56.
47 E. A. Ross, "Prohibition as the sociologist sees it," *Harper's Monthly Mag.*, 1921, *142*, 188.
48 *Ibid.*
49 *Ibid.*, p. 189.

of the race, he argued that this loss would be more than repaid in other benefits.[50]

Professor Thomas N. Carver, a noted Harvard economist, attacked the alcoholic selection argument by placing it within the context of mechanized society. If it were granted that "fool-killers" might be freely employed for race improvement, society must still insist that only fools were killed. Drunken locomotive engineers and automobile operators might destroy capable, healthy people as well as killing themselves. Liquor was therefore "inaccurate" in operation. Laboratory eugenics had to recognize that human beings functioned under different environmental circumstances than caged guinea pigs.[51]

Could mankind be subjected to alcoholic selection, for several generations perhaps, even though an improved race might result? The editor of the *Journal of the American Medical Association* and *Hygeia,* who stated that alcoholic selection improved racial stocks, posed the problem in the following way:

> The fact has been proved on guinea pigs, fowls, rats, mice, rabbits, frogs, and insects. But if this fact is applied to the human race, an entirely different point of view must be held, since the care of such weak, defective, or otherwise impaired specimens as come through embryonic life to human existence is a social problem.[52]

It was possible to accept the evidence for alcoholic selection and deny that society could, in good conscience, allow it to continue.

Drys also pointed to experiments which did not confirm the results of Stockard and Pearl. Herbert S. Jennings, of the Johns Hopkins University, cited some scientific work with varied organisms which indicated that alcohol sometimes eliminated normal forms and perpetuated abnormal ones. He concluded that the available results did not provide a valid "basis for practical measures" so far as mankind was concerned.[53] The *Anti-Saloon League Year Book* reported an experiment, showing no selective improvement, in which alcohol was administered "by the stomach, as man takes it, instead of by inhalation, the method employed by Dr. Stockard and several other recent investigators . . . ."[54] It seems

[50] *Ibid.*, 189-192.

[51] T. N. Carver, *Principles of national economy*, Boston, 1921, pp. 602-604. With a changed emphasis, from generalized vice to the specific dangers of alcoholism, this section of Carver's book appeared in a dry publication. See T. N. Carver, "The inefficiency of alcohol as a fool killer," *Sci. Temp. J.*, 1921, *30*, 21-22.

[52] Morris Fishbein, "Alcohol in the practice of medicine," *World's Work*, 1928, *56*, 67.

[53] H. S. Jennings, "The inheritance of acquired characters," *Forum*, 1926, *76*, 707.

[54] Cora F. Stoddard, "Scientific phases of the alcohol problem," *Anti-Saloon League Year Book*, 1925, p. 62.

clear, however, that drys were placed on the defensive by doctrines of alcoholic selection, just as wets had been embarrassed by the racial poison hypothesis.

It is not realistic to presume that the research scientists who experimented with the effects of alcohol on animals were unaware of the political implications of their work. For instance, the editorial group responsible for the volume *Alcohol and Man* (1932) disclaimed any desire to influence current views of Prohibition.[55] Although the majority of the foregoing sources suggest partisanship, most of the scientific reports dealing with the effects of alcohol, and treatments of these reports in secondary works, did not suggest any relationship between laboratory results and Prohibition.

Notwithstanding the foregoing discussion, it appears that competing views concerning the racial efforts of alcohol were somewhat peripheral in the debate over Prohibition from 1920 to 1933. The question was, to be sure, usually raised in works treating Prohibition comprehensively and it engaged the attention of a dozen or more noted scientists and intellectuals. But the highly technical nature of some of the arguments and the fact that there were conflicts in laboratory results, from investigator to investigator and from one animal species to another, made this question relatively unattractive for propaganda purposes.[56] This seems to have been a problem that threatened to become central but never did.

[55] Haven Emerson, Ed., *Alcohol and man*, New York, 1932, pp. v, vi.

[56] The most notable instance of scientific disagreement took place when British experimenters repeated Stockard's work with guinea pigs and found no evidence of transmissible injury to germ cells. See F. M. Durham and H. M. Woods, *"Alcohol and inheritance: an experimental study," Spec. Rep. Ser. med. Res. Coun. (Lond.), 168,* 1932. At least two American sources appeared willing to accept the British experimenters' suggestion that Stockard had failed to impose adequate controls on the stock used in his work. See Paul Popenoe and R. H. Johnson, *Applied eugenics*, New York, 1933, p. 29, and "Alcohol and inheritance," *Amer. J. Pub. Hlth*, 1932, 22, 1167-1169.

UNIVERSITY OF TORONTO

Infernus factus est
Fac sicut pagam
Infernus ap ipm

"Sick Man Surrounded by Physicians, Saints, and Demons"

A woodcut from the *Ars Moriendi,* by an anonymous German artist, late 15th century. New Haven, Yale Medical Library, Clements C. Fry Collection.

Religious texts on the method of dying with nobility, sanctity, and courage—and with the reward of eternal grace—were popular from the late middle ages through the Renaissance. Addressed to the clergy and used for personal instruction and teaching, sometimes at the bedside of the moribund patient, the treatises describe the temptations of life and those confronting the dying man.[1] These books were useful to the clergy who had to maintain the populace in constant preparedness for sudden and widespread death.

The development of woodcuts permitted rich illustration of the didactic presentation. The *Ars Moriendi,* the most widely circulated guide, appeared in over twenty editions in Latin, French, English, and German during the last half of the fifteenth century. At least thirteen complete sets of prints for the treatise are known.[2] All sets follow the pattern of the original copperplate engravings of the Master E.S., or the Master of 1466, an artist of the Upper Rhine. The blockbook prints do not antedate the copper engravings, but the copperplates were circulated only with manuscripts.[3,4] A series of ten prints depicts, in pairs, the temptation of Satan followed by the guidance of the angels in relation to each of five moral deviations: faithlessness, despair, impatience, vainglory, and avarice. The first woodcut, *Temptacio Dyaboli de Fide,* is reproduced here.

The emaciated patient stares blankly forward while three demons cajole: *Infernus factus est* (Hell is here!), *Fac sicut pagani* (Act like the pagans!), and *Interficias te ipsum* (Kill yourself!). In the foreground the nefarious deeds are personified. The pagan royalty worship an idol, a female stands nude, and a man brings a suicide knife to his throat. The physicians stand between demons and idol, at the deathbed playing only a minor role. God, reading from a book, Jesus, and Mary dominate the head of the bed. In an English edition by Caxton (1485), *The Arte and Crafte to Know Well to Dye,* the author expresses a sentiment—perhaps acceptable to some even today—which characterizes the print's motif: "As thenne the bodyli deth is the most ferfull thing of all other thinges soo yet is the deth of the soule of as moche more terryble and reprouchable, as the soule is more noble and more precyous than the body."[5]

D.J.C.

[1] Hind, A. M. *An introducion to a history of woodcut. With a detailed survey of work done in the 15th century.* Boston, Houghton Mifflin, 1935. 2 vols., I, p. 226.

[2] Schreiber, W. L. *Manuel de l'amateur de la gravure sur bois et sur métal au XVe siècle.* Vol. IV, contenant un catalogue des livres xylographiques. . . . Leipzig, O. Harrassowitz, 1902, pp. 253ff.; Vol. VIII, contenant la deuxième partie des fac-similes des livres xylographiques. . . . Berlin, A. Cohn Succ., 1900, pl. 98-110.

[3] Lehrs, Max. Der künstler der Ars moriendi und die wahre erste ausgabe derselbe. *Jb. preuss. Kunstsamml.,* 1890, *11,* 161ff.

[4] Cust, Lionel. *The Master E.S. and the "Ars Moriendi." A chapter in the history of engraving during the XVth century.* Oxford, Clarendon Press, 1898.

[5] *A Reprint in facsimile of a treatise spekyinge of the arte & crafte to knowe well to dye, translated oute of frenshe in to englysshe. by Willm Caxton.* [1485] London, Solde by the Assigns of Edward Lumley, deceased, M.DCCClxxv.

Notes and Events

Edited by Dorothy M. Schullian*

Boerhaave's Teaching in Relation to Beccari's Identification of Gluten as an "Animal" Substance

A recent article on Beccari as "the discoverer of vegetable protein"[1] describes how he found a glutinous component in wheat flour which putrefies as animal matter does. In the *Bologna Commentaries* which appeared in 1745, Beccari was reported as saying, in a discourse given in 1728, that "vegetable matters . . . never putrify except where art is applied."[2] It must, however, have been generally known that some plant materials putrefy and turn alkaline in the way supposed to be characteristic of animal substances, instead of fermenting to give vinous and acid, vinegary liquids. This fact had been taught for a number of years by the far-famed Boerhaave at Leiden to the students who flocked to him from all over Europe. Beccari was evidently well acquainted with the views of Boerhaave, in whom he expressed "the greatest confidence,"[3] and it seems strange for him to have been unaware of the point in question.

While energetically denying the theory of effervescences between acid and alkaline body fluids, Boerhaave expounded a view of the assimilation of vegetable food to animal nature which emphasized that it involves turning acescent into alkalescent matter. The broad basis for this view was the difference in behavior, in modern terms, of carbohydrate-rich and protein-rich material on incubation or distillation. Too vigorous or too feeble a process of animalization was supposed to lead to diseases of alkalinity or acidity, respectively.[4] Causes and cures for these were suggested in accordance with the theory. Thus, among the causes of "distempers of a spontaneous alcali" was too much alkalescent food; this meant mostly food from animals, especially carnivores, but also included "some plants (that) abound in a matter, which, if putrefied of its own accord, doth not turn into an acid substance, nor run together, but melts away into a stinking fat alcali: such are most all aromatick plants that have a very sharp taste."[5] Similarly, to cure diseases from an acid humour, the recommendations included "aliments that destroy sourness, whether taken from animals or the vegetable kind."[6]

More details were given in Boerhaave's chemical lectures, in which he clearly stated that some plant materials, including various bulbs, fleshy roots, and seeds, resemble animals in their disposition to putrefy rather than ferment. Here, too, was mentioned the destructive distillation used by

* History of Science Collections, Cornell University Libraries, Ithaca, New York.

Beccari to corroborate the "animal" nature of gluten.[2] Boerhaave described how most plants, on dry distillation in a closed atmosphere, give an oily, acid salt or "vinegar," while animal and the exceptional plant matters give an oily, alkaline salt.[7] The chemistry lectures were not published by Boerhaave himself until 1732,[8] but he had been teaching the subject at Leiden since early in the century, first privately and then, from 1718 onwards, as professor. By 1729, exasperation at an inaccurate but popular version of his course published by students helped to induce him to relinquish the chair.[9]

The comments made here do not detract in any way from Beccari's very significant achievement in separating the glutinous and amylaceous fractions of wheat flour from each other and individually characterizing them. He seems to have been the first to describe the isolation from plants of a substance which would nowadays be called a protein. He was not, however, the first to realize that substances of "animal" nature occur in plants.[10]

F. R. Jevons

References

1. Beach, E. F. Beccari of Bologna. *J. Hist. Med.*, 1961, *16*, 354-373.
2. Quoted in Beach, *op. cit.*, p. 363.
3. *Ibid.*, p. 365. He also wrote that "no one at all after Boerhaave is unaware" of certain particles which that author supposed to be present in the air (*ibid.*, p. 367).
4. Cf. Jevons, F. R. Boerhaave's biochemistry. *Med. Hist.*, 1962, *6*, 343-362.
5. Boerhaave's *Aphorisms*, no. 76. The quotation is taken from an English translation (William and John Innys, London, 1724) made from the third Latin edition (Leiden, 1722). The first Latin edition of the *Aphorisms* was dated 1709.
6. *Ibid.*, no. 66.
7. Boerhaave, H. *Elements of chemistry*, translated by Timothy Dallowe, London, 1735, vol. II, pp. 93-99 (Processes XXXII and XXXIII). Plants of the latter kind "have such an agreement with animals, with regard to what is produc'd from them by a chemical analysis, that they differ very little, if any thing at all" (*ibid.*, p. 98). Cf. also p. 117 (Process XLII) and p. 202 (Process LXXXVIII).
8. The manuscript of the *Elementa chemiae*, together with an English translation, was already in the hands of a printer in July, 1729 (Lindeboom, G. A. *Bibliographia Boerhaaviana*, Leiden, Brill, 1959, p. 81).
9. Boerhaave, *Elements of chemistry*, 1735, vol. I, pp. vii-viii. There were printings of the spurious work at Paris, Amsterdam, and Venice from 1724 onwards (Lindeboom, *op. cit.*, p. 80).
10. The author is grateful to Dr. H. B. Vickery for comments which helped him to make these conclusions more explicit.

Charles Darwin, William Osler, and "The Fixed Period"

William Osler once recommended retirement at sixty. His humor and true feelings were misinterpreted by the press and as a result his address, "The Fixed Period" (the title borrowed from Anthony Trollope), is recalled chiefly for the notion of death by chloroform at that age.[1] Cushing[2] supplied the background to this event, and it was reviewed recently by Viets.[3]

Charles Darwin once expressed an opinion similar to the better known remarks of Osler although it preceded them in point of time. He recorded it with the appropriate background in his autobiography,[4] and so far as I know it has not received much attention. Darwin said, "What a good thing

it would be, if every scientific man was to die when sixty years old, as afterwards he would be sure to oppose all new doctrines." This view was addressed to his friend and supporter, the distinguished geologist Sir Charles Lyell.[5] Many years later Lyell reminded Darwin of it and added that he hoped now to be allowed to live. The point arose in connection with Lyell's personal and scientific qualities. Darwin wrote, "His candour was highly remarkable. He exhibited this by becoming a convert to the Descent-theory, though he had gained much fame by opposing Lamarck's views, and this after he had grown old."

The central issue for Osler and Darwin was, of course, effectiveness, productivity, and the scientific mind. Darwin stated his concern, and Lyell met the challenge. Osler spoke of periods in a teacher's life—study until twenty-five, investigation until forty, professional activity until sixty, and then retirement. Darwin was more fortunate than Osler in that his opinions were expressed privately and his status at the time gave no cause for newspaper publicity. But the important question involving the years of greatest creativity remains with us, as does the problem of ever-increasing years of education and apprenticeship for scientist and physician alike.

JEROME M. SCHNECK

REFERENCES

1. Osler, W. The fixed period. In *Aequanimitas*. Philadelphia, P. Blakiston's Son & Co., 3d ed., 1932.
2. Cushing, H. *The life of Sir William Osler*. New York, Oxford University Press, 1940.
3. Viets, H. R. William Osler and "The fixed period," *Bull. Hist. Med.*, 1962, *36*, 368-370.
4. Darwin, C. *The autobiography of Charles Darwin*, With original omissions restored, Edited with appendix and notes by his grand-daughter Nora Barlow. New York, Harcourt, Brace and Company, 1958.
5. Dampier, W. C. *A shorter history of science*. Cambridge, Cambridge University Press, 1944.

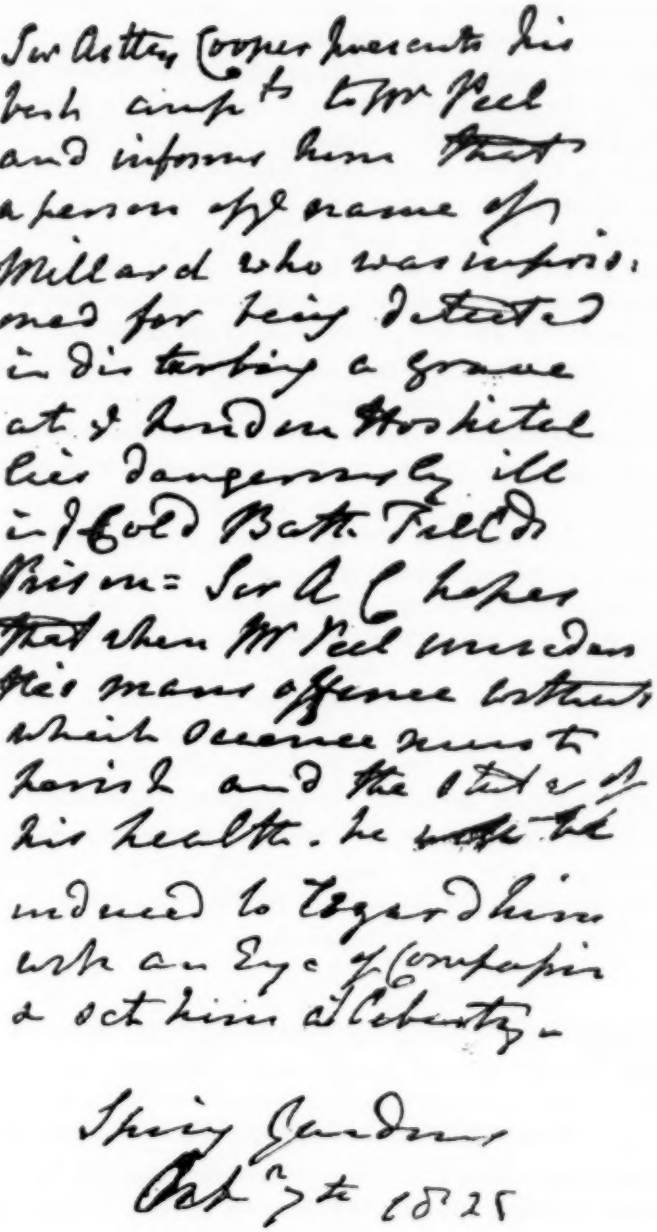
Sir Astley Cooper and William Millard—A Vindication

The Department of the History of Medicine of the University of Kansas has recently acquired, from a reputable source, the following MS. letter (see Fig. 1):

Sir Astley Cooper presents his best compts to Mr Peel and informs him that a person of ye name of Millard who was imprisoned for being detected in disturbing a grave at ye London Hospital lies dangerously ill in ye Cold Bath Fields Prison: Sir A C hopes that when Mr Peel considers this man's offence without which science must perish and the state of his health, he will be induced to regard him with an eye of compassion & set him at liberty.

Spring Gardens
Octr 7th 1823

At first glance this MS. seems unworthy of further comment—after all, Sir Astley had many dealings with the resurrectionists, and to find him interceding with Mr. Peel (then Home Secretary) for a pardon for resurrectionist Millard is what one would have expected of him. However, Bransby Cooper in his biography of Sir Astley relates how Millard, a former super-



Sir Astley Cooper presents his best compts to Mr Peel and informs him that a person of the name of Millard who was imprisoned for being detected in disturbing a grave at St Pancras Hospital lies dangerously ill in the Cold Bath Fields Prison — Sir A C hopes that when Mr Peel considers the mean offence which occasioned this punishment and the state of his health. he will be induced to regard him with an Eye of Compassion & order him at liberty —

Spring Gardens
Oct 7th 1825

FIG. 1.

intendent of the dissecting-room at St. Thomas's Hospital and latterly a full-time resurrectionist, was confined in Cold Bath Fields' prison for robbing a grave (in company with Patrick, another resurrectionist): "he refused his food, was constantly shedding tears, and gradually sank under the affliction. This extreme state of despondency was said in some measure to be caused by the refusal of Sir Astley Cooper to solicit a pardon for him from the Secretary for the Home Department, according to a request which Millard made to him for the purpose. Millard became greatly enraged at Sir Astley's refusal of his petition, and was heard to swear that he would revenge himself by inflicting some bodily harm upon him."[1] Bransby Cooper goes on to record how he himself went to the prison and "saw Millard about a week or ten days before he died: he was then in the lowest state of despondency. The immediate cause of his death was a fever which he caught in the infirmary, where in spite of the remonstrances of his friends, the disorder being then prevalent in that part of the prison, he had remained rather than go to his cell. From his depressed condition of mind and body, he soon sunk under the malady, and died in a state of raving madness."[2]

Millard's wife took up a literary cudgel on behalf of her deceased husband, and "subsequently published a work, entitled an *Account of the Circumstances attending the Imprisonment and Death of the late William Millard, &c.* Its chief object appears to have been to vilify Sir Astley Cooper, for refusing to intercede for her husband's discharge from prison, or afterwards to settle a pension upon herself; but it was loaded with statements, so evidently absurd, respecting the various metropolitan hospitals, and such violent abuse of the officers severally connected with them, that it defeated its own object, and failed to attract any attention."[3]

If we can assume that Sir Astley's letter to Mr. Peel was, indeed, received by that gentleman, it would appear that the anti-Cooper strictures of Millard and his wife were unjustified, and that Sir Astley's part in this whole rather sordid affair was beyond reproach.

L. R. C. AGNEW

1 B. B. Cooper. *The life of Sir Astley Cooper, Bart.*, 2 vols., London, 1843; vol. 1, p. 445.
2 *Ibid.*, p. 445.
3 *Ibid.*, pp. 445-446.

The "Raid" on Malpighi's Villa a Fiction

For well over a century, writers on Marcello Malpighi have interpreted a letter which he wrote to Lorenzo Bellini on 17 June 1689 as the report of an actual raid upon Malpighi's villa by a band of ruffians led in disguise by his enemy Giovanni Girolamo Sbaraglia. There was no such raid. In my forthcoming book on Malpighi I shall prove that this letter is rather a Bernesque parody of the attack which Sbaraglia made upon the neoteric physicians (and particularly upon Malpighi's work, though he goes un-

named) in his *De recentiorum medicorum studio* and that it was inspired by Malpighi's acquaintance with Traiano Boccalini's *Ragguagli di Parnaso.*

HOWARD B. ADELMANN

Historical Notes in the American Journal of Cardiology

Since its inception in 1958 the *American Journal of Cardiology* has published, usually in alternate months, a series of notes on the history of cardiology and related subjects. The titles of notes previously published are given in this journal (1959, *14*, 90-91; 1960, *15*, 85; and 1961, *16*, 77-78). The following have appeared or will appear in 1963:

Aortic Coarctation and Aortic Stenosis (Nixon, 1834)—February
Scudamore on Monsieur Laennec's Method (1826)—April
Acute Pericarditis with Exanthem (1829)—June
Henry I. Bowditch on Diaphragmatic Hernia (1853)—August
Hughes and Cock on Thoracentesis (1844)—October
The Difficulty of the Diagnosis of Pericarditis (Bouillier, 1812)—December

Each note contains either the entire text or excerpts from the text of an old work on cardiology or aspects of medicine related thereto, especially pathology and physical diagnosis. The reprinted text is accompanied by brief historical analysis. It is hoped that the series will encourage at least an occasional cardiologist to view his work in the perspective of time.

SAUL JARCHO

D. J. Davis Lecture

The twentieth annual D. J. Davis Memorial Lecture on Medical History was delivered at the University of Illinois College of Medicine, Chicago, Illinois on 17 April by Loren C. MacKinney, Ph.D., Kenan Professor of Medieval and Renaissance History at the University of North Carolina. The title of the lecture was "Early Medical Practice as Seen in Manuscript Miniatures and Texts."

The Red Cross as a Symbol

T. D. Whittet, Chief Pharmacist & Lecturer in Pharmacy at the University College Hospital, Gower Street, London, W.C.1, England, is preparing a paper entitled "The Red Cross as a Medical and Pharmaceutical Symbol before and after the Geneva Convention." He would be grateful for any information about the use of the cross as a medical, pharmaceutical, dental, or surgical symbol or as a trade mark or pharmacy name at any period in history.

Edvard Gotfredsen, 1899-1963

On 8 January 1963 the Danish historian of medicine Edvard Gotfredsen died in Copenhagen from sequelae of several coronary thromboses. He

had served as consulting editor to the Journal and as an editor of *Centaurus;* he was known internationally also as director of the Medical Historical Museum at the University of Copenhagen. He was a familiar figure at international congresses in the history of medicine and was for many years chairman of the Danish Society for the History of Medicine.

Dr. Gotfredsen received his M.D. degree in 1942 from the University of Copenhagen with a dissertation on the teaching of antiquity on the heart, vessels, and pulse which was published as Volume I of the *Acta Historica Scientiarum Naturalium et Medicinalium* of his university. In 1950 he was appointed professor of the history of medicine there. His publications included a *Medicinens Historie* (1950) which was used in all Scandinavia and articles in this journal on the relations between British and Danish medicine in the seventeenth and eighteenth centuries (1953, *8,* 46-55) and on the reception of Harvey's doctrine in Denmark (1957, *12,* 202-208). He will be remembered not least for the competent and charming facsimile editions (1950 and 1951) of his countryman Steno's *Discours sur l'anatomie du cerveau* (1669) and *De glandulis oculorum, novisque earundem vasis observationes anatomicae, quibus veri lacrymarum fontes deteguntur* (1662).

Henry Schuman Memorial Lecture

The first Henry Schuman Memorial Lecture, in the series founded by Dr. John A. Benjamin of Rochester, New York, was presented at the University of California Medical Center, Los Angeles, on 18 February 1963. The speaker was Dr. Hugh Macdonald Sinclair, Fellow and Lecturer in Physiology and Biochemistry at Magdalen College, Oxford, the subject "Boerhaave and his Influence upon Medicine."

Colonial Manuscripts in the Department of Health and Welfare, Mexico City

Donald B. Cooper has reported his discovery of various old manuscripts, written in Spanish, which relate to the administration during colonial times of two hospitals in Mexico City. All of these manuscripts have been microfilmed and are now available for study at the Department of the History of Art, Yale University. They are listed in Dr. Cooper's article, "A Selective List of the Colonial Manuscripts (1564-1800) in the Archives of the Department of Health and Welfare, Mexico City" (*Hispanic American Historical Review,* 1962, *42,* 385-414).

The first hospital is the Hospital del Amor de Dios. Over 800 folios were found which relate to this institution. Most of these are financial rather than medical in character, and many relate to rental properties which were owned by the hospital. These records date mainly from the late sixteenth and early seventeenth centuries, and consequently are among

the earliest hospital records extant for any hospital of the Western Hemisphere. The earliest date is 1586.

The second hospital is the Hospital de San Pedro. A college and church were operated with the hospital, and although several thousand folios were found which relate to San Pedro, it is difficult to estimate precisely how many of these concern only the hospital. Most of these papers date from the years 1700-1750. They are mainly financial in character; some relate to rental properties, others to expenditures for medicine, bread, meat, salaries, etc. For further information readers should consult Dr. Cooper's article, especially pages 388-389, and Appendix "C" on pages 413-414. Requests for reprints of this article may be sent to the author in care of the Department of History, Oklahoma State University, Stillwater, Oklahoma. His dissertation, *Epidemic Disease in Mexico City, 1761-1813* (Austin, Texas, 1963; v, 278, 2 leaves, mimeographed) is available on film from University Microfilms, Inc., Ann Arbor, Michigan.

Establishment of the Albert Deutsch Memorial Foundation

In the fall of 1961 friends and associates of the late Mr. Albert Deutsch established the Albert Deutsch Memorial Foundation to promote, encourage, and provide for studies and education in the field of mental health. Those who may wish to assist in the work of this organization may send their contributions to the president, Dr. Julius Schreiber, 1130 Dupont Circle Building, Washington, D. C.

Book Reviews

S. A. J. MOORAT. *Catalogue of Western Manuscripts on Medicine and Science in the Wellcome Historical Medical Library.* Vol. 1. *Manuscripts Written Before 1650 A.D.* London, The Wellcome Historical Medical Library, 1962. vii, 679 pp. £10.10s. $30.00.

Reviewed by CURT F. BÜHLER, *Keeper of Printed Books, The Pierpont Morgan Library, New York, New York.*

THE collection of early medical and scientific manuscripts in the Wellcome Library comprises one of the most distinguished groups of specialized material of this nature in the world. The library, according to the present catalogue, can boast of no fewer than 801 such manuscripts, of which 278 (or well over a quarter of the total) may be judged to date from before 1501 (the year which sets the limit for the "rarissima" amongst scientific codices). A wonderful lot of manuscripts these are, no less than 31 of which have come from that fabulous storehouse, the Phillipps library. With very few exceptions, all the really great names of mediaeval scientific and medical history are listed here, so far as these normally occur in handwritten volumes. Just so that Mr. Poynter may still have something to search for in order to complete the collection in his charge, one may note that the Wellcome Library does, occasionally, have lacunae; for example, there are no manuscripts of Dinus or Thomas de Garbo, nor of the *Chirurgia* of Petrus de Argellata in the catalogue.

The catalogue which Mr. Moorat has compiled is fully worthy of these fine volumes. The individual descriptions, so far as may be judged at this distance, are full and accurate, though one may express regret that collations (by quires) are not provided. Cross-references are remarkably ample, and this reviewer failed to find any serious slips. The eleven special indices will provide any investigator with every conceivable means for extracting the maximum amount of information from this work.

Invaluable as this catalogue is for the specialist in the history of medicine and science, it will prove itself equally useful for students with other interests. Several manuscripts previously "unlocatable" re-appear in its pages. Thus, the *Index of Middle English Verse* by Carleton Brown and Rossell Hope Robbins (New York, 1943) could not locate the Loscombe-Ashburnham MS. under no. 3848; it is now Wellcome no. 406. The Payne MS. (B-R 3422) can now be cited as Wellcome MS. 542, and the unique manuscript providing the poem listed under B-R 3120 is identifiable as Wellcome MS. 673. The Middle English scholar, too, will happily note that the text listed under MS. 411.1 is probably either B-R 1905 or 1989, while the next item in the same volume is certainly still another manuscript of the ever-popular *Dietary* by John Lydgate (B-R 824; also in Wellcome MS. 406.9). Since this poem is not attributed to Lydgate in the catalogue, his

name does not appear in the indices. Then too, the present reviewer is able to add at least three more examples to his list of manuscripts copied from printed books: MS. 10, MS. 252 ("The edition from which this MS. was copied [Venice, 1616] does not seem to be recorded in the bibliographies"), and MS. 346, specially noteworthy as containing notes by that learned scholar, Johann Reuchlin.

The work under review contains no more misprints than we are bound to allow. This reviewer, however, looks askance at such author-headings as: Pseudo-Thomas Aquinas, Saint [1224-1274]; Pseudo-Bede, The Venerable [672-735]; and Pseudo-Hippocrates [460-375 B.C.]. Surely, if the author was not Aquinas (or Bede), he was probably not a Saint (nor The Venerable), and it is highly improbable that the dates of any "Pseudo-" would have been identically the same as those of the historical person.

That the illustration in the volume was limited to the colored frontispiece of the Platearius MS. (no. 626) is regrettable. Undoubtedly, the Anglo-Saxon leaf (MS. 46) was worthy of a plate; and probably the Cicero (MS. 195), the Phalaris (MS. 619); the Serapion (MS. 747, misnumbered 749), the unusual English scroll (MS. 632), one of the herbals (MSS. 573 or 336)—among others—deserved at least a figure.

It is strange how often catalogues of manuscripts, phenomenally correct in themselves, will go awry in their bibliographical statements, and this volume contributes its share of (admittedly minor) sins of this sort:

MS. 15. Albertus de Saxonia. "This work [Quaestiones in Aristotelis libros physicorum] was first printed at Venice in 1500." The *Gesamtkatalog der Wiegendrucke* (I, col. 392) asserts that this is no more than a fragment of the edition of Venice: Jacobus Pentius, 13 April 1504.

MS. 130. Bernardus de Gordonio. "The 'Lilium' was first printed at Venice in 1480." Actually printed (Klebs 177.1) at Naples: Francesco del Tuppo, 20 May 1480.

MS. 274. Firmicus Maternus. "This work was first printed at Venice in 1497." Actually in 1499 by Aldus Manutius (Klebs 405.1).

MS. 505.4 (note). Ratdolt's Venetian edition of Sacrobosco's *Sphaera mundi* appeared in 1482, not 1492 as in the catalogue. (In 1487, the printer returned to his native Augsburg, where he was still active in 1510).

MS. 613. Petrus de Abano. "The 'De venenis' was first printed at Mantua in 1472." Actually in 1473 (Klebs 774.1), though the *Gesamtkatalog* (No. 2521) asserts that the Paduan edition of the same year was the earlier of the two.

MS. 623. Platearius, Johannes. "The 'Practica brevis' was first printed at Ferrara in 1488." This is very probably a ghost, as the earliest printing of this text recorded by Klebs (911.2) is Venice: Locatellus for Scotus, 16 December 1497. Mr. Moorat's citation, however, can boast a very ancient history: Sarton I. 770; Hain 14694; Panzer I. 399. 43; Maittaire p. 781; etc.

These are, it has been said and it bears repetition, minor flaws in an otherwise excellent work. The catalogue of the Wellcome manuscripts will indeed be welcomed by all scholars and libraries interested in mediaeval and Renaissance studies.

F. N. L. POYNTER, Ed. *A Catalogue of Printed Books in the Wellcome Historical Medical Library. I. Books Printed Before 1641.* Foreword by Sir Henry Hallett Dale. London, The Wellcome Historical Medical Library, 1962. xv, 407 pp. $30.00.

Reviewed by DONALD G. WING, *Associate Librarian, Yale University Library.*

THE Oxford University Press and the Wellcome Library are both to be congratulated on the pleasing appearance of this second volume listing the Library's resources. The same skillful librarian was responsible for the *Catalogue of Incunabula* in 1954. Those 302 entries are here reprinted with shorter collations, together with new acquisitions. Here, however, are listed for the first time, nearly seven thousand titles published during the next one hundred and forty years. Five hundred and forty-six are English works, but the greater wealth of the collection lies in Sir Henry Wellcome's purchases of continental literature during the last sixty years, and since his death, in 1936, by his librarians. Besides medical works—and their cousins the herbals—here is a fine collection of the classics of the scientific renaissance, on more than four hundred double-column pages.

The largest group is 137 editions of Galen, the second largest, 84 entries under Paracelsus, Hippocrates has 80, and Aristotle, 53 entries. Other major selections are by Gesner, Cardan, Fuchs, the *Regimen Sanitatis,* and the *Secrets* of Alessio. At the end of the volume, are three most useful indexes: one of places of publication, one of printers and publishers, and a concordance with S.T.C. numbers. The most prolific publisher was the Giunta family with 149 entries, the Aldines number 46, Étienne, 35, and Tovrnes, 38.

An unusual heading occurs early in the volume where under "Anatomical fugitive sheets" twelve broadsides appear which might otherwise have been lost. Thirteen official pharmacopoeias are grouped together later on.

Plans are announced for succeeding volumes to bring the catalogue down to 1850. It is to be hoped that another volume may be devoted to the recent purchase from Dr. Francisco Guerra of his collection of early American books, both English and Spanish. There already exists Mr. S. A. J. Moorat's *Catalogue of Western Manuscripts* before 1650, and we may hope for a catalogue of Oriental manuscripts to follow. London is indeed fortunate to have such an assemblage of medical historical riches in such an hospitable place as the Wellcome Museum in the Euston Road.

WILLIAM H. DAVENPORT. *The Good Physician.* New York, The Macmillan Company, 1962. x, 564 pp. $7.50.

Reviewed by SAUL JARCHO, *Associate Attending Physician, Mount Sinai Hospital, New York, New York.*

THE volume under review is an anthology of materials about physicians, prepared by Dr. William H. Davenport, Professor of English and Chair-

man of the Department of Humanities at Harvey Mudd College in Claremont, California. In the foreword Dr. Davenport explains that he has been interested in the relations between literature and the professions and that in 1958 he issued an anthology of literature dealing with law. In the present volume, he says, ". . . I hope to indicate that historically, ethically, sociologically, psychologically, literarily, there is more to medicine than routine practice. Professional and laymen alike should catch from these pages a sense of the great tradition, the living record of a great calling." I interpret this to mean that Dr. Davenport has intended the anthology to give a broad picture of the physician's life and work. This he has accomplished, interestingly and well.

The compiler refers to his selections as snippets. This is an excess of modesty, since almost every one of the four dozen passages runs for about ten large pages. Indeed, one of the merits of the book lies precisely in the fact that the passages are large and leave definite impressions on the reader. Each selection is prefaced by a concise editorial note. In many instances these notes encourage the reader to seek out the original texts.

The book is divided into nine major sections. The first of these is titled *Early Days* and includes a strong description of Paré by Stephen Paget, a portrayal of seventeenth-century medicine by Ernest S. Turner, and a splendid essay on Dominique-Jean Larrey by J. H. Dible. This is followed by a section on four great discoverers, viz. Harvey, Hunter, Jenner, and Withering. The last-named is the subject of an exemplary study by the lamented John Fulton.

The third section, devoted to the student and the young doctor, contains some of the best material in the anthology, especially an essay by the late W. J. Bishop on the evolution of the general practitioner in England, an obstetrical excerpt from Somerset Maugham's *Of Human Bondage*, an excerpt from Hans Zinsser, and a piece of the autobiography of William Carlos Williams.

The same section also includes an essay by Oliver Wendell Holmes, *The Young Practitioner*, and Osler's *A Way of Life*. At the risk of excommunication I must report that I found Osler's sermon unendurable. (Indeed, this virtuous tract does not do justice to the great virtues of its author.) In contrast the paper by Holmes proved completely fresh and palatable.

Another excellent group of selections is labelled *The Patient*. In addition to a sturdy fragment by Arthur Hertzler and another by William Carlos Williams, this section contains three impressive pieces by laymen—Jean Stafford, Goronwy Rees, and Carol Bartholomew. The passage by Miss Stafford and that by Mr. Rees are memorable descriptions of the reactions of injured persons.

Editorial limitations preclude more than the briefest mention of the other attractive excerpts which abound in Professor Davenport's book.

The following deserve special mention: K. Dewhurst on Chekhov, Sir Russell Brain's *Dickensian Diagnoses,* Stewart Holbrook on quackery in medical education, and Berton Roueché on placebos.

It is to be hoped that the new anthology will gain the popularity that it so obviously deserves.

ESMOND R. LONG. *A History of American Pathology.* Springfield, Illinois, Charles C Thomas, 1962. xiv, 460 pp., 55 illus. $12.50.

Reviewed by RALPH H. MAJOR, *Professor Emeritus of Medicine and of the History of Medicine, Department of the History of Medicine, University of Kansas School of Medicine, Kansas City, Kansas.*

THE author of this work is a distinguished pathologist and also an outstanding medical historian. Active in the field of pathology for all the years of his professional career, Esmond Long brings to this book the maturity and background unattainable by the medical historian whose knowledge of pathology rests solely on his investigations in the library. It is more than a history of American pathology. We find here also a history of American medicine, a history of the foundation of the major American medical schools, of the American Medical Association, the Association of American Physicians, the American Association of Pathologists and Bacteriologists, and many other medical societies. The history of certain medical journals devoted to medical research and pathology is included.

The book begins with the early explorers and continues to the present. The author stresses the role of William H. Welch as the leader of his generation and quotes with approval the statement of Flexner that he was "the teacher at large of scientific medicine throughout the nation" and probably the first "to combine the pathological anatomy of Virchow with the experimental pathology of Cohnheim and the bacteriology of Koch, in the laboratory of one man." This sympathetic portrait of Welch will be readily recognized by "Popsy's" old students. Many other outstanding pathologists, such as Councilman, MacCallum, Flexner, Opie, Delafield, Ophüls, Wood, Adami, and Boyd, are the subject of brief biographies in which their work is evaluated. The Chicago group of pathologists, Hektoen, Le Count, Rickets, H. Gideon Wells, and Christian Fenger, is described in an interesting fashion.

Christian Fenger (1840-1902), the dean of the group, was one of the outstanding medical men of his period. A Dane and a graduate of the Univeristy of Copenhagen, he worked under Rokitansky in Vienna, studied Bilharziosis in Egypt, and came to Chicago in 1878. He was a surgeon by inclination and a very skillful one, but his extensive knowledge of pathology and bacteriology soon brought him fame as a pathologist. "He revolutionized medicine in Chicago by revolutionizing its pathology." Fenger's influence was all-pervasive in pathology, bacteriology, and surgery.

The work of Howard T. Ricketts and of M. A. Barber is described.

When Robert Koch visited the United States in 1908, he told his friend, William H. Welch, that the two most interesting things he had seen in America were the organisms Ricketts had found in Rocky Mountain spotted fever and Barber's device for isolating bacteria and obtaining pure cultures.

Many pathologists deserving of more extended comment have been relegated to a few lines, but this is inevitable in a work of such scope, covering a period of four centuries. The reader gains the impression that American pathology, a somewhat stunted growth at first and requiring frequent grafts from Europe, has grown into a very sturdy tree with luxuriant foliage.

The book contains an adequate index and includes portraits of 53 outstanding pathologists. The appearance of these illustrations would have been improved by using a paper of better quality.

HERBERT THOMS. *Chapters in American Obstetrics.* Springfield, Illinois, Charles C Thomas, 1962. 2d. ed. xiii, 158 pp., 15 illus. $4.50.

Reviewed by CLAUDE E. HEATON, *Professor of Obstetrics and Gynecology, New York University School of Medicine, New York 21, New York.*

THE appearance of a second edition of this unique little classic is a welcome event, for the first edition which appeared in 1933 has been hard to come by for a long time.

Your reviewer recalls with how much pleasure he read and reread the original edition, making the acquaintance in some instances for the first time of the pioneers of obstetrics. Among them were William Shippen, the first public teacher of obstetrics in this country; Samuel Bard, the author of the first systematic book on the subject by an American; Oliver Wendell Holmes, author of the classic paper on the contagiousness of puerperal fever; William Potts Dewees, the father of American obstetrics, and other leaders in the field.

The publisher's blurb is incorrect in stating that this is the only book to appear on this aspect of American medical history. J. Whitridge Williams, preceptor and friend of Dr. Thoms, wrote a fine history of early American obstetrics up to 1860. Indeed, the author acknowledges his debt to Dr. Williams in a prefatory note to the new edition.

Dr. Thoms has written a much more readable book than Williams did and he now includes leaders in obstetrics of the late nineteenth century. New material includes chapters on Parvin, a pioneer in the teaching of clinical obstetrics in hospital practice; Platt, who caused a furor when in 1850 he delivered a patient before some members of the senior class of the University of Buffalo Medical School; Henry Miller, pioneer obstetrician in the new West; and Keep, the first to use ether in obstetrics in this country. Included also are new chapters on Meigs and Hodge of Philadelphia and Storer and Richardson of Boston.

There is one error in the otherwise excellent chapter on Colonial Beginnings. In the colony of New Amsterdam *ziekentroosters* or comforters of the sick did not act as midwives. They were men and they were forbidden to practise medicine by the West India Company. Their duty was to console the seriously ill. As early as 1630 the Company appointed an official midwife.

Chapters in American Obstetrics is delightful and rewarding reading not only for medical historians, but also obstetricians and residents in training.

G. A. LINDEBOOM. *Boerhaave's Correspondence, Part I.* Leiden, E. J. Brill, 1962. ix, 241 pp. 30 guilders.

Reviewed by JOSEPH EWAN, *Professor of Botany, Department of Botany, Tulane University, New Orleans, Louisiana.*

HERE are 143 letters written to and by the Oracle of Europe, the Hippocrates *Redivivus.* A Chinese mandarin addressed a letter "Boerhaave–Europe" and tradition says it reached him. Hermann Boerhaave, born on the last day of the year 1668, one of nine children, the son of a clergyman, was "physician and plant-lover by the Grace of God, Professor of Chemistry and of Botany by the grace of the Board of Curatores."

Boerhaave's biographers, from Samuel Johnson (1739) and William Burton (1743; 2d ed., 1746) to the modern writers Rooseboom (1938), Guyénot (1941), Gibbs (1949), Pasti (1950, unpublished thesis), Kerker (1955), and now Lindeboom, have all signalized one or another facet of this polymath. Kerker wrote that "if modern chemistry is the offspring of Lavoisier then Boerhaave was its grandsire," at the same time conceding that Boerhaave's main interest was medicine. George Pasti said it was chemistry. Altogether 178 students took medical degrees at Leyden under Boerhaave. At the age of thirty-three he began lecturing in theoretical medicine and published his *Institutiones Medicae* seven years later. In 1709 he added botany to his medical instruction at Leyden and that year published his *Aphorismi.* In 1718 he became professor of chemistry and fourteen years later published his *Elementa chemiae,* partly to circumvent piracy of his lecture notes! Goethe called this "gewaltig angezogen." Timothy Dallowe, M.D., one of Boerhaave's translators, said "in many places [he] is prettey prolix," yet no one matched him for clarity or organization.

Boerhaave commenced his exchange of plants, seeds, letters, and publications–his "commercium"–and obviously enjoyed this interplay but he was overwhelmed by it. This was the neap tide of discovery for Holland. Linnaeus met the challenge by introducing a workable system of classification by a kind of pre-punch-card sorting of plant characters. He went to Leyden to study under Boerhaave, whom he greatly admired, and found his garden a paradise. Boerhaave tried, unsuccessfully, to urge Linnaeus

to settle in Holland. Boerhaave's energies in publishing the works of Swammerdam, Vaillant, and Vesalius, besides his own compendia mentioned above, must have fired Linnaeus to master planning. On 13 January 1737 Boerhaave praised Linnaeus whom "ages to come will applaud, good men will imitate, and all be improved."

Professor Lindeboom writes sympathetically of Boerhaave—"my love and admiration for the man . . . have grown steadily." He gives us a five-page preface on "Boerhaave as a correspondent," and short explanatory introductions to the three chief letterwriters, Macro, Sherard, and Sloane. Letters in Latin are translated. There are 18 letters by and to Cox Macro; 73 letters by and to William Sherard, of whom Boerhaave wrote on his death, "the world of scholars [has] lost its greatest ornament"; and 27 letters by and to Hans Sloane, with one describing how a patient added nux vomica to the punch instead of grated nutmeg! Of the minor figures in the collection, Dr. Cromwell Mortimer (M.D., Leyden, 1724) wrote eight; Dr. Richard Mead, five; Charles Alston, two; Dr. John Arbuthnot, two; and there is one letter each from William Burton, Jacob Haddon, Dr. Joseph Letherland (M.D., Leyden, 1724), Dr. Theophilus Lobb, Johan Polanus, and Sir John Wedderburn. There are two portraits: Sloane (familiar) and Mead (unfamiliar) and several holographic facsimiles. The letters are a veritable gallery of vignettes: Pontedera, Marsigli, Tilli, Fahrenheit, Isnard, Ruysch, Boretius, William Houston, the uncle and nephew Amman, etc., etc. Boerhaave's own letters are tolerant, informative, and frequent are exclamations like the one to Sloane, "Exsultabam! I jumped for joy!"

MYRTLE GREENFIELD. *A History of Public Health in New Mexico.* Foreword by Karl F. Meyer. Albuquerque, New Mexico, The University of New Mexico Press, 1962, xv, 383 pp. $5.00.

Reviewed by JEANNE L. BRAND, *Scientist Administrator (Social Sciences), International Research Programs Section, Research Grants and Fellowships Branch, National Institute of Mental Health, Bethesda, Maryland.*

DR. GREENFIELD, a bacteriologist who served as Director of the New Mexico Public Health Laboratory from 1920 to 1956, has compiled an official history of the recent development of public health in that state. The account centers primarily on the period 1945 to 1955, although two chapters review the establishment of the state department of health in 1919, and the first 25 years of its activities. Five of the 14 chapters were written by directors of various divisions of the health department. Dr. Karl Meyer has added a felicitous foreword.

The years of pioneer service in such a public health setting give Dr. Greenfield a valuable understanding of the manifold public health problems faced by this department. Although the narrative is not formally

documented, the book is exceptional in containing 124 appendix pages of useful primary source material.

There can be no question of our need for more regional public health histories in this country. Although the number of social historians writing in public health fields has increased slightly in recent years, there are still too few people equipped both with the analytical skills of the professional historian and an understanding of public health. Of the few state public health histories extant today, only Philip Jordan's *The People's Health; a History of Public Health in Minnesota to 1948* (St. Paul, Minnesota Historical Society, 1953), and the broader two-volume *Rudolph Matas History of Medicine in Louisiana,* edited by John Duffy and completed last year, attempt to place health problems in their social, historical perspective. Historical reviews by such experienced, public health administrators at Dr. Greenfield, nevertheless, make a useful contribution to the field.

NICOLAS ANDRY. *Orthopaedia.* Facsimile reproduction of the first edition in English, London, 1743. Philadelphia and Montreal, J. B. Lippincott Co. [1961]. 2 vols. $10.00.

Reviewed by ULRICH H. WEIL, *Clinical Instructor in Orthopedic Surgery, Yale University School of Medicine.*

IN 1741 Nicolas Andry published a book in Paris which was destined to become a milestone in medical literature. A facsimile reproduction of the first English translation of 1743 is now available and it is a pleasure to browse through this *Orthopaedia: or, the Art of Correcting and Preventing Deformities in Children.* Written as a manual for parents who wished to raise well-formed and healthy children, much of the *Orthopaedia* dealt with non-medical subjects. At times it is a strange mixture of valid observation and treatments, of medical ideas already disproven when it was first published, of old wives' tales, of medications which could have been concocted in an alchemist's kitchen, and of glaring superstitions. Nevertheless, Andry's book remains one of the first major contributions to orthopaedic literature.

The title, which was coined from the Greek words orthos—straight and paidion—child, was a more fortunate choice than other artificial combinations in that it became the name of a new medical field. The book itself became extremely influential in paving the way for a better understanding of the deformities and diseases of the musculo-skeletal system.

Now Andry's name is more familiar to the orthopedic surgeon than the contents of his book. For this reason, the new publication fills a real need. It consists of two volumes, subdivided into a Preface, four books, a Thesis on exercise, and a Supplement. In addition to the derivation of the title, the preface contains reviews of two earlier books on similar

subjects, the *Pædotrophia* of Scévole de Sainte-Martha and the *Callipædia* of Claude Quillet, two early "textbooks" of pediatrics.

Book I is a descriptive anatomy of the locomotor apparatus. Books II and III deal with deformities of the musculo-skeletal system and their treatment. Book IV discusses deformities and ailments of the head and teeth and afflictions of seeing, hearing, and speaking.

The Thesis defends the proper use of exercises as the best preserver of health. Those readers who want to test their knowledge of classical languages may do so by reading this section since the thesis is also printed in Latin.

The Supplement is a refutation of criticisms of the author's observations and therapeutic methods. This section is of great interest as it acquaints us with Andry as a human being, one who, like most of us, resents criticism, is not above hair-splitting to prove his point, and can be very sarcastic in his counterattack on his critics.

Books II and III and the Thesis show a sometimes strikingly modern approach to the causes of musulo-skeletal deformities, sound methods for their corrections, and keen observations of the effectiveness of properly applied exercises.

Andry's great contribution to medicine is his discovery, or at least rediscovery, of the molding influence of muscle traction on bone, and therefore the shaping of a child's body, the efficiency of massage, the value of therapeutic exercises, and proper bracing. It is a pleasure to review a book of this historical importance, not only because of its interesting content, but also for the appearance of these volumes. They should make a welcome addition to the library of all who are involved in the treatment of children. The publishers, the editors, and the Yale Medical Library who supplied the original copy are to be congratulated on this excellent reproduction.

EUGÈNE OLIVER. *Médecine et Santé dans le Pays de Vaud. Des Origines à la Fin du XVII Siècle.* Lausanne, Librarie Payot, ? 1961. 2 vols. illus.

Reviewed by C. D. O'MALLEY, *Professor of Medical History, Department of Anatomy, University of California Medical Center, Los Angeles.*

A LITTLE over twenty years ago Eugène Olivier (1868-1955) produced an extensive study entitled *Médicine et santé dans le pays de Vaud au XVIII siècle* (1939). His work now under consideration deals with the history of medicine and public health in the same region from prehistoric times until the close of the seventeenth century and so deals with that long span of time preceding those earlier volumes. The author, whose life is summarized in a preface by J.-C. Biaudet, had almost completed the manuscript of his study at the time of his death so that despite the editorial contributions of Jean-Pierre Clavel and Charles Roth, according to their

modest assertion the book remains almost entirely as written by Dr. Olivier.

The first volume deals with the history of medicine in the district of Vaud, that area of Switzerland lying to the north of Lake Geneva and including Lausanne as its principal city. It is arranged in chronological divisions: (1) prehistoric times and the period of Helvetian independence, (2) the Roman period, (3) the fifth century to 1536, (4) the period from 1536, when the district of Vaud came under Bernese control, to about 1680. The account is erudite, thoroughly documented from the second section onward, and makes interesting if not especially exciting reading. However, the bulk of the work is too great to be considered here in any detail, and consequently references can be made to only a few matters.

The author investigated medieval monastic medicine with commendable thoroughness, and this section of the first volume, as well as that on medieval hospitals, represents a contribution of some importance. Lay medicine, as reflected in the activities of physicians of the district, was of no special significance. The number of physicians seems never to have been very large, and since they tended to associate themselves with the nearby court of Savoy or with important personages in the district, the mass of the population had little choice but to resort to folk medicine and the dubious ministrations of charlatans. Moreover, the district of Vaud, representing a kind of rustic backwater, influenced or controlled at different times by the duchy of Savoy and the canton of Berne, held no strong attraction for foreign physicians who might otherwise have entered it to fill the need. It was perhaps as a result of this situation that the guild of surgeons, based upon Lausanne, became especially strong.

Toward the close of the period covered in the first volume, that is in the sixteenth and seventeenth centuries, a few persons of more than local importance were for a time associated with the district. For three years Conrad Gesner taught in the Academy of Lausanne. The celebrated surgeon Pierre Franco, who is given extensive and valuable consideration, and Fabricius of Hilden were likewise briefly active in the district of Vaud, as well as the physician Turquet de Mayerne, originally from the nearby area of Geneva and of course chiefly remembered for his very active and successful career in England. On the whole, however, Dr. Olivier's account is local history, very thoroughly investigated, but nevertheless of somewhat limited appeal.

The second volume deals in the same thoroughly documented way with epidemic diseases and public health measures of all sorts, including a detailed discussion of local diet and the peculiar regulations and the economics of Swiss bath-houses. Of the two volumes the second is the more interesting relative to the general European situation throughout the period under consideration, since the epidemics which struck the district

were the same as those which played havoc in other parts of Europe, and public health standards were pretty much the same as those elsewhere—perhaps not praise of the highest order for the medical profession, since whatever sensible regulations were put into effect were not necessarily owing to its advice and guidance.

Dr. Olivier has produced what may be termed a definitive work on the history of medicine and public health in this one area of Switzerland. He deserves to be remembered for this achievement even though the subject of his research lies somewhat outside the mainstream of medicine's historical evolution.

FÉLIX MARTÍ-IBÁÑEZ. *Ariel. Essays on the Arts and the History and Philosophy of Medicine.* New York, MD Publications, Inc., 1962. xiii, 292 pp. $6.50.

FÉLIX MARTÍ-IBÁÑEZ. *The Epic of Medicine.* New York, Clarkson N. Potter, Inc., 1962 xiv, 294 pp., 33 colored, 240 black and white illus., $15.00.

Reviewed by EDWIN CLARKE, *Visiting Associate Professor of the History of Medicine, Yale University School of Medicine.*

IT seems unnecessary to consider in detail Dr. Martí-Ibáñez's brand of medical history. Several able reviewers have already dealt with his works devastatingly but his writings continue to pour forth.

The two most recent publications can therefore be considered together and briefly. *Ariel* is a collection of essays which have all appeared elsewhere, some of them more than once and as their content and style follow the now-established pattern, it would be superfluous to elaborate upon them.

The *Epic of Medicine,* however, differs from all the rest because it is lavishly illustrated and because Dr. Martí-Ibáñez is now editor. But we are not spared the pultaceous prose which introduces each historical period. These essays are all to be found in *Ariel* (and elsewhere) so that if there could be a society for the prevention of exploitation and maltreatment of English prose, they would be clamouring for admission to it. However, the idea of juxtaposing medical history with other historical developments is a good one, for no one would wish to deny that medicine is an important part of civilization and therefore of its history. But unfortunately the editor and his colleagues have not been entirely successful in this laudable task. The sections dealing with the various periods of history lack balance, they are too superficial, and they demonstrate a defect of adequate knowledge and appreciation of the significant events. Moreover, there are frequent factual errors and misinterpretations. Apart from the garish and fictitious coloured plates, the illustrations are valuable for although many are well-known, there are also many much less commonly seen, and their reproduction is excellent.

The editor's "series of living tapestries" are certainly, as he says, the stuff of medical history but the textual fabric is threadbare and the illustrative material cannot make up for this deficiency.

WALTER MÜRI. *Der Arzt im Altertvm. Griechische und Lateinische Quellenstücke von Hippokrates bis Galen mit der Übertragung ins Deutsche.* München, Ernst Heimeran Verlag, 1962. 507 pp.

Reviewed by EDWIN CLARKE, *Visiting Associate Professor of the History of Medicine, Yale University School of Medicine.*

THIS is the third and expanded edition of a collection of the editor's translations from the works of ten medical and four non-medical Greek and Roman writers; the medical authors most frequently included are Hippocrates, Galen, and Celsus. The Greek or Latin text is on the left page and the translation is facing it. The extracts are grouped into seven chapters: the duty and obligation of doctors, sketches of individual doctors, the physician at the bedside, health and disease, anatomy and surgery, dietetics and drugs, and the borderlands of medicine. Appendices contain notes to the selections, their sources, a short but well-chosen bibliography, a glossary of individuals' names, and a small chronological table.

These are the editor's translations, which he has checked against others where they were available. It is an excellent book, somewhat reminiscent of Brock's *Greek Medicine,* for it makes available a useful collection of primary sources with a minimum of editorial intrusion or possible distortion. A similar work with English translations would be valuable.

CLAUDE BERNARD and J. J. IZQUIERDO. *Medicina Experimental.* Mexico City, University of Mexico Press, 1960. 418 pp.

Reviewed by JOSÉ M. R. DELGADO, *Associate Professor of Physiology, Yale University School of Medicine.*

THE name of Claude Bernard is well known in Spanish-speaking medical schools. His basic contributions and his interesting life are often commented upon in lectures, while the study of his philosophical views and his penetrating advice in scientific research are less known. The previous Spanish versions of Bernard's writings on experimental medicine, one published in Spain in 1880 by Dr. Antonio Espinos y Capo and the other in Mexico by Don Carlos García in 1900, are very difficult to find. Some other translations, such as the one by Manuel Granell (Buenos Aires, Espasa-Calpe, 1947) have been rather fragmentary. The careful translation by Dr. Izquierdo should be most welcome and may be of great importance in acquainting students and scientists with the creative and powerful imagination of the father of the experimental method.

The book has two parts: the first being the second edition of a critical study of Bernard's life originally entitled "Bernard, Creador de la Medicina

Cientifica" (University of Mexico Press, 1942). The second part is a translation into Spanish of the classical *Introduction à l'Étude de la Médecine Experimentale.* The fact that both parts are united in one volume accounts for the surprising joint authorship in *Medicina Experimental* of a contemporary scientist with another of the last century.

One of the merits of Dr. Izquierdo's work is the interesting way in which he discusses Claude Bernard as the originator of general physiology. of the scientific method, and of experimental medicine. The controversial position of Claude Bernard is presented with lucidity and sophistication with an explanation of his attempts to escape from the orbits of materialism and vitalism. Dr. Izquierdo also clarifies the scientific determinism of Claude Bernard, which differs from the philosophical determinism of Leibniz and was a necessary condition for moral freedom, because if physiological mechanisms involved in moving an arm were not regulated by fixed and invariable determinants, one would lack the freedom to move it in any desired direction.

Discussing problems in experimental medicine, Dr. Izquierdo vividly describes some of the present handicaps experienced in the university atmosphere of Mexico, where sometimes true scholarship may be overshadowed by false values. He also comments on the fact that students, participating in the selection of teachers, may be biased against the professor who is severe in the final examinations. If the scientific spirit of Claude Bernard and his zeal in the search for truth could permeate and could be understood by students and professors, a great improvement could be expected in their scientific attitudes.

Among the many lessons to be found in the life and work of Claude Bernard is one which perhaps should be emphasized today—his care in not publishing new findings until they had been convincingly and thoroughly demonstrated. His studies on curare, for example, started in 1849, did not appear formally until 1856. This pace would not be suitable in our world of progress reports and research applications, but his concern about accuracy and reliability would certainly improve the qualtiy of many investigations and would reduce the quantity of unimportant papers which unduly increase the bulk of published material.

The translation of the *Introduction à l'Étude de la Médecine Experimentale,* which is in excellent Spanish, proves the fluidity and skill of Dr. Izquierdo's writing and also reveals his competence in this subject. In his critical evaluation of Claude Bernard we miss valuable comments that could have been made, comparing Bernard with the Spanish histologist, Santiago Ramón y Cajal, who, with his work, his life, his philosophical ideas, and his book, *Reglas y Consejos,* has been very influential in the philosophical and methodological development of many Spanish-speaking scientists. Cajal also deplored the cult of false values, gave great encouragement to the young scientist, and has been a living example

of the possibility of success even in university atmospheres which might be hostile, or perhaps worse, envious or indifferent.

W. J. BISHOP and SUE GOLDIE. *A Bio-Bibliography of Florence Nightingale.* London, Dawson's of Pall Mall, 1962. 160 pp., 15 illus. 50s.

Reviewed by ANNE L. AUSTIN, *Nursing Historian, Philadelphia, Pennsylvania.* [*Formerly Professor of Nursing, Western Reserve University, Cleveland, Ohio*].

THE present publication, sponsored by the Florence Nightingale International Foundation of the International Council of Nurses, is intended to show the great scope of Miss Nightingale's work and provides for the first time a complete guide to her published writings. It is to be followed by a Calendar of her extant letters. It includes works published from 1849 to 1954 and consists of books, pamphlets, periodical articles and memoranda on various subjects, including army hygiene and sanitation, hospital administration and statistics, Indian land reform, sociology, religion and philosophy, and nursing. The items are presented under nine headings: Nursing, The Army, India and Colonial Welfare, Hospitals, Statistics, Sociology, Memoirs and Tributes, Religion and Philosophy, and Miscellaneous Works. The latter category includes some hitherto untraced works listed by Sir Edward Cook. Titles which are concerned with more than one topic are dealt with under the most pertinent heading with cross references. There is a selected list of writings about Florence Nightingale and her times and a chronological list of her writings. A few illustrations, are presented, chiefly of title pages of some of her better known works. Each item is annotated in long notes which outline the contents and history of the publication. The location of one copy is occasionally given.

Florence Nightingale is known to the general public mainly as a famous war nurse who revolutionized the care of the sick and wounded in the Crimean War. As such she became a legend in her lifetime; as Benjamin Jowett says, "for all the wrong reasons." A reading of her writings changes this picture, not by obliterating it, but by adding many important facets to it. Much of her writing is to be found in Government reports, or is in publications in the British Museum or other extensive collections. Much of it was not intended for wide circulation but for distribution among her interested friends or those whom she wished to influence to carry out her desires.

The contents reveal the many interests of this great woman and the profound and detailed knowledge which she possessed in many fields. The best known title is probably *Notes on Nursing,* the first edition of which appeared (undated) in 1859. It was reissued many times and was tranlated into German, Italian, and French. It is an unsurpassed treatise on nursing. Sir James Paget called it "an alphabet of household hygiene,"

while Harriet Martineau considered it "a work of genius, if ever I saw one." It was reviewed enthusiastically in all the leading newspapers and periodicals of the time, including *The Quarterly Review, The Lancet, Punch, Literary Gazette, The Athenaeum, The Examiner, Weekly Despatch, The Dial, the Medical Times Gazette,* and the *Illustrated Times.* The present location of three very early copies is given.

Addresses to nurses are numerous, as are publications relative to the British Army. Perhaps next in importance to *Notes on Nursing* are writings on Indian and Colonial Welfare. These show an astounding knowledge of India, especially for one who had never visited that country. Her practice of emphasizing the main theme in the title by a positive and a negative approach is well illustrated in such titles as *How People May Live and Not Die in India,* and *Life or Death in India.* The writings on Hospitals rank in importance with these. The other groups included overlap these in content to some degree while adding new titles.

It will be apparent to those who examine this publication with care that it is an invaluable source and research tool for those who wish to acquire understanding beyond the limits of the legend and for those who desire to make a first-hand study of Miss Nightingale's life and work.

JAMES GRAY. *Education for Nursing.* Minneapolis, Minnesota, University of Minnesota Press, 1960. 239 pp., 27 illus. $5.00.

Reviewed by ANNE L. AUSTIN, *Nursing Historian, Philadelphia, Pennsylvania.* [*Formerly Professor of Nursing, Western Reserve University, Cleveland, Ohio*].

THE subtitle of this book, "A History of the University of Minnesota School," indicates its concern with education for nursing in one school, through whose history it is possible to gain some insight into the creation of the profession of nursing. It is a readable and interesting account of the beginnings, evolution, and present status of a school which has been in existence for a little over fifty years. It records the faith of members of the medical profession in the future of nursing and relates in some detail the innovations by nurse leaders which helped to bring the school to a satisfactory state of excellence. Included also is the part played by its graduates in world affairs. Although the program in the beginning fell short of the ideals of its founders, the history of this first school of its kind illustrates the planning and execution of a program of classroom and clinical teaching leading to a degree. This was accomplished in the face of many difficulties in providing qualified faculty, student facilities, patient care, and proper living conditions.

The story begins with a brief account of nurses' training and nursing care as they were known in the nineteenth century and the changes wrought by the dynamic ideas of Florence Nightingale and by the persistent efforts of such leaders as Isabel Hampton, Adelaide Nutting, Lillian Wald, and

others. In 1908, Dr. Richard Olding Beard of the University Medical School added his voice to the call for reform, and through the cooperation of Dr. Louis Baldwin, Superintendent of the Eliot Hospital, and others, the program was inaugurated. Bertha Erdmann was appointed a nurse director and was later succeeded by Louise Powell, through whose intelligent and unwavering efforts great advances were made. The activities of organized nursing and other groups, and their relation to the growth of the school, are also pointed out. In the decades which followed, a new look at nursing needs suggested the desirability of programs for preparing workers to assist the professional nurse and also for the preparation of graduate nurses for teaching, supervision, and administration in hospitals, schools, and public health agencies.

The vision of the future presented in the last chapters promises a continuation of the auspicious beginnings. Several photographs of those concerned with the growth of the school through the years add interest to a challenging story.

CLIFFORD MORSON. *St. Peter's Hospital for Stone: 1860-1960.* Baltimore, Maryland, The Williams and Wilkins Company, 1960. viii, 64 pp., 18 figs. $5.00.

Reviewed by CLYDE L. DEMING, *Clinical Professor Emeritus of Urology, Yale University School of Medicine.*

THE author has presented the history of St. Peter's Hospital in London from the date of its founding, 1860, to the present time, a period of a hundred years. Its purpose is well defined. It was founded at a time when barber surgeons were being replaced by physicians trained in surgery. It was a time too, when specialties were being born and special hospitals were being built to give the surgeons a more dignified place to perform surgery. Mr. Morson clearly indicates that the medical profession as well as the laity demanded this transformation.

The account of the growing period of the hospital includes coincidental improvement in the treatment for bladder stone. The mortality rate in "cutting for stone" from 1860 to 1873 was 15.25 per cent with average hospital stay of 100 days, while the figures given for 1915 to 1924 were 2.2 per cent mortality and an avereage hospitalization of 5 days.

The names of all the surgical chiefs are given, their period of tenure, and the contributions of each to the Hospital. Armstrong Todd, the founder surgeon, requested that all patients necessarily should have a bath. He also insisted on a special place for autopsies. Coulson built an operating theatre into which the neighbors could not look. Fenwick was the first in England to use a cystocope and developed the first opaque ureteral catheter. The latter part of the nineteenth century saw x-ray being used for the demonstration of bladder and kidney stones. Sir Henry Morris

was the first surgeon to remove a kidney stone successfully. Freyer developed the suprapubic prostatectomy which was further perfected by Sir Thompson Walker. It was a time when dexterity was a special asset to the surgeon, and the average time for performing this operation was three minutes, clocked by the bystanders. Not all the surgical chiefs were primarily urological surgeons. Edwards was a rectal surgeon, Wells, an ovariotomist. They came from Ireland and Scotland, as well as London. The one requirement was that they have membership in the Royal College of Surgeons.

In the early days of St. Peter's, nursing was a problem, for head nurses were paid 35 to 50 pounds a year. Nursemaids were brought in to dust and sweep. Other assistants necessary to a hospital were added. Special anesthetists are recorded beginning in 1876, radiologists in 1904, and pathologists and bacteriologists at later dates.

Mr. Morson, who served as chief surgeon to St. Peter's from 1919 to 1946, has competently presented the 100-year history of the world-renowned hospital and its impact on medicine and the public. His book is highly recommended.

P. KUTUMBIAH. *Ancient Indian Medicine.* Foreword by Dr. S. Radhakrishnan. Madras, Orient Longmans Ltd., 1962. xiv, 225 pp. Rs. 15s.

Reviewed by MARTIN LEVEY, *Research Associate, School of Medicine, Department of History of Science and Medicine, Yale University.*

IT is well known that the Hippocratic corups contains materia medica of Indian origin. The later Greek and Arabic practitioners are heavily obligated to the earlier Indian works and practices.

Ayurveda is the name given by the ancient Indians to their science of medicine—from *ayuh* "life" and *veda* "to attain." It is therefore the science whose knowledge leads to the understanding of the nature of life and its prolongation. The Vedas, the earliest sacred books of India, are four in number, Rigveda, Samaveda, Yajurveda, and Atharva-veda. The existence of the Ayurveda is a myth. Atharva-veda and the Rigveda provide us with most of our knowledge of this period.

Post-vedic medicine begins about 800 B.C. when the Rigveda attained a more or less canonized form. The creative period of Indian medicine was from 600 B.C. to 200 A.D. In this time, three important samhitas, the Charaka, Susruta, and Bhela, became the classics of ancient Indian medicine.

Anyone who has attempted to study the Charaka, Susruta, and other ancient Indian medical works will appreciate Dr. Kutumbiah's new general account. This well written work, beginning with the third millennium B.C. civilization of the Indus Valley, is clear and concise. The relevant philosophical and medical problems are probed with an excellent grasp

of the material without the usual emotional involvement to be found in a work of this type.

From the chapter headings one may obtain a good idea of the contents of this book: Ancient Indian anatomy, Physiology, This doctrine of Tridosa, Aetiology, Classification and Pathology of diseases, Diagnosis and Prognosis, Materia medica, Treatment, Surgery in Ancient India, Ophthalmology, Obstetrics, Gynaecology, and Paediatrics. A good index and references are provided.

Although Jolly's *Indian Medicine* is still to be preferred by the scholar, Dr. Kutumbiah's work will surely win a place for itself with the layman who is interested in early medicine in India.

JOAN BENNETT. *Sir Thomas Browne.* Cambridge, The University Press, 1962. viii, 255 pp. $5.50.

FRANK LIVINGSTONE HUNTLEY. *Sir Thomas Browne: A Biographical and Critical Study.* Ann Arbor, University of Michigan Press, 1962. 283 pp. $4.95.

Reviewed by ROBERT T. PETERSSON, *Professor of English, Smith College, Northampton, Massachusetts.*

THE diarist John Evelyn made a special trip to Norwich in 1671, to visit Dr. Thomas Browne, by that time famous as physician, author, and natural scientist. This is the man, says Evelyn, "with whom I had sometime corresponded by letters, though never saw before, whose whole house and garden being a paradise and cabinet of rarities, and that of the best collection, especially medals, books, plants, natural things, did exceedingly refresh me."

Sir Thomas Browne—a man of his times if ever one existed—was a mine of scientific knowledge, a touchstone for the English Reformation, a Janus-faced figure respectful of the past but looking forward to modern times, and one of the great prose masters in English. Coleridge was intoxicated by him:

> Sir Thomas Browne is among my first favourites. Rich in various knowledge; exuberant in conceptions and conceits, contemplative, imaginative; often truly great and magnificent in his style and diction, though doubtless too often big, stiff, and hyperlatinistic; . . . he is a quiet and sublime Enthusiast with a strong tinge of the Fantast, the Humorist constantly mingling with and flashing across the Philosopher, as the darting colours in shot silk play upon the main dye. In short, he has brains in his head, which is all the more interesting for a *little twist* in the brains.

His celebrity began with his first work, the *Religio Medici,* published in 1642. Of it Coleridge says, "this book paints certain parts of my moral and intellectual being, (the best parts, no doubt), better than any other book I have ever met with—and the style is throughout delicious."

The *Religio,* though probably his *chef d'oeuvre,* is but a part of his diverse production.

No two books could exhibit better than the ones here considered, the characteristic ways of an English don and an American professor. The first, rather easy and comfortable, assumes that one loves Browne, understands Browne, and sets it all down with some trouble and much pleasure; while the second, more serious and ambitious, assumes the professional obligation to add something new to the world's knowledge and understanding and manifests the professional feeling that we must present ourselves well armed, with no chink in the scholarly armor through which an enemy blade might enter. Good books can result from either conception. But this time Professor Huntley's has a character distinctly superior.

Mrs. Bennett seems to be pointing to a specific Browne: the writer. Without searching very strenuously for the new knowledge and insights hidden away in a hundred periodicals and books, Mrs. Bennett goes it alone. And why not? A royal welcome awaits the book which can bring out the artistic qualities of Browne's elusive, swift, oblique modes of thinking. But her book is not, at least by comparison with Mr. Huntley's, a rewarding literary study. Mrs. Bennett makes clear in her foreword that she will shy away from "close analysis" of style, and she declines also the difficult descent into Browne's works in order to discover the sources of their form and structure and of their enormous imaginative energy. Her observations are never brought into telling relationship with one another. Quotation and paraphrase are her main techniques, and after exposing 73 of the *Religio's* 75 sections and all eleven sections of the *Pseudodoxia,* Book I, the writer herself acknowledges "the risk of tediousness." We are made weary by the formulary language. Yet in the second of Mrs. Bennett's chapters on the *Pseudodoxia,* where she appears to be most strongly engaged, this language miraculously disappears, and we begin to realize that in proportion as these formulæ have defined her modes of perception, they have evidently interfered with her understanding.

Yet the book is a balanced and civilized *entrée* into Browne. Mrs. Bennett is reverent without being idolatrous, never yielding, as others have, to either sentimentality or aestheticism, never inflating a modest emotion of Browne into something cosmic and Miltonic. Just here, however, in the cosmic and Miltonic ideas which Browne sometimes brilliantly creates, is where the challenge to understand Browne is not taken. Mrs. Bennett holds up her subject and turns it for our view—in much the same way that Browne himself views the macrocosmic world at a distance: "I use it like a globe, and turn it round sometimes for my recreation."

Mr. Huntley's is the most thoughtful and valuable book on Browne yet published. For Browne's life and for his works, he starts from the

roots, preserving independence of judgment, yet making discriminating use of virtually all the Browne literature. His chapters on science and religion at first sound pedantic but prove in the end to be clear and authoritative. The biography is written entirely anew, out of the sources (including some that Mr. Huntley has himself discovered). It shows that Browne's life was one full flow of seventy-seven years, with his various writings completely immersed in the current. In his treatment of these writings, Mr. Huntley's knowledge is joined to a keen perception of internal form and a sympathetic insight into Browne's imagination. In thirty pages he says more about the art and meaning of the *Religio Medici* than anyone in print. And his presentation of the *Garden of Cyrus* and *Hydriotaphia* as companion pieces on life and death, brings them out under fuller illumination than ever before.

No one knows better than Mr. Huntley that a book of 250 pages cannot say it all. Yet he is determined to make the attempt. Consequently two defects appear, which both, in opposite ways, mar the proportion, if not the significance of the book. The discoveries produced by Mr. Huntley's researches are in fact minor, yet the space they occupy is considerable. Fifteen pages are given to the question of *to* whom and *about* whom Browne wrote *A Letter to a Friend,* and twelve more to building up, from very skimpy materials, Browne's trip to Ireland. The book suffers badly from overcrowding. Mr. Huntley knows every orbit of Browne's activity and since all appear, some are too highly compressed. It is regettable, for instance, that his discussion of the *Religio's* circular form is foreshortened, for that is its inmost and all-pervading secret.

The case for Browne as scientist may be doomed to failure from the start. His trained eye observed many things instructively (e.g. circulation), but he discovered nothing more important than *adipocere,* the fatty substance exuded by corpses. He was not a Gilbert, a Boyle, a Harvey, or a Hooke, as a scientist; nor as a Christian, a Pascal. He was, perhaps, a minor Bacon. By denying the will-o'-the-wisp analogies of medieval thought, he advanced the procedures of science on the basis of hypothesis (which he may have understood better than Bacon) and experimentation. Mr. Huntley asks whether Browne really was a scientist. His answer cannot be unequivocal. Authority, reason, and experiment are Browne's three determinants of truth, and his absolute authority is God. In the end we shall understand with Mr. Huntley that "to Browne the end of science is the glory of God." Living in "divided and distinguished worlds" Browne is never uncertain about which world prevails. Basil Willey's assertion that Browne was "not finally committed" should be altered to say that he was committeed *only* finally.

Browne had "brains in his head," ideas, and a style. His ideas would not have survived without the style. As Mrs. Bennett says, "his memory is green because he was a master of English prose."

BOOK NOTICES

K. F. MEYER. *Disinfected Mail.* Holton, Kansas, The Gossip Printery, Inc., 1962. 341 pp., illus. $12.00.

ONE of the less well-known consequences of the contagion theory of disease was the disinfection of mail. From the fifteenth to near the end of the nineteenth century attempts were made to decontaminate mail which had been in contact with plague, smallpox, cholera, and other contagious disorders. But, so far as is known, infection has never been spread by this route.

Disinfected Mail is a very important contribution to a topic which is probably known to the philatelist better than to the medical historian. This is the first attempt to deal with the whole subject in detail and to propose a listing by country of all the known and recorded letters and covers. In this task Dr. Meyer has had the collaboration of seven European specialists of the subject. The various methods of fumigation are described, and the ways in which this was recorded on the envelope or cover constitutes the major part of the book. Only the material presently available or already recorded is included, and as more is discovered no doubt this book will grow in size. Even now, however, it will be the standard work on the subject.

Edwin Clarke

CHARLES CLAYTON DENNIE. *A History of Syphilis.* Springfield, Illinois, Charles C Thomas, 1962. x, 137 pp., 2 figs. $7.50.

A GOOD, modern history of syphilis has been long awaited, but the wait must continue, for Dr. Dennie's book does not fill this need. Although his observations on his contemporaries during the more recent development of syphilology are valuable, in the earlier periods the story is somewhat confused, unbalanced, and at times inaccurate. There are few references to the secondary literature, which the author must have drawn upon heavily, and documentation is minimal. Moreover, there is little awareness of pertinent events and trends outside the confines of the limited topic being discussed.

Edwin Clarke

FREDERICK A. WILLIUS and THOMAS E. KEYS. *Classics of Cardiology. A Collection of Classic Works on the Heart and Circulation with Comprehensive Biographic Accounts of the Authors.* Vols. I and II. New York, Dover Publications, Inc., 1961. Vol. I: xv, 1-399 pp., illus. $2.00. Vol. II: xi, 400-858 pp., illus. $2.00.

THE first edition of this book was published in 1941 and was well received (e.g. *Ann. med. Hist.*, 1942, *4* (3d. ser.), 85,. Since then it has been a useful source of original and mostly unabridged papers which have contributed to the development and progress of present-day cardiology. This is an unaltered, paperbacked reproduction, and although some of the illustrations have suffered in the process, its appearance once more, and in this cheap form, is very welcome.

Edwin Clarke

RUSSELL BRAIN. *Some Reflections on Genius and Other Essays.* Philadelphia, J. B. Lippincott Company, 1961. vii, 192 pp., illus. $6.00.

ONLY five of these fourteen essays have not been published elsewhere. Two of the five deal with Johnson (thus making five in all on this theme): Fanny Burney's contacts with him, and his mental state. Another discusses Lord Monboddo as an evolutionist and anti-Johnsonian, and another the author's conversations with Epstein. The fifth new essay is concerned with neurological aspects of speech and words. Lord Brain's pleasant style, his wide contact with literature, and his interesting topics help to make this an attractive book for light and occasional reading.

Edwin Clarke

GEOFFREY KEYNES. *Dr. Timothie Bright, 1550-1615.* London, The Wellcome Historical Medical Library, 1962. 47 pp., 17 illus. 21s.

THIS is the Gideon de Laune Lecture delivered at Apothecaries Hall, 28 April 1961. It contains first a short biography of Dr. Timothie Bright (?1550-1615) who was more interested in literary and theological pursuits than in his medical duties as physician to St. Bartholomew's Hospital, London; much of this information is already in W. J. Carlton's standard account (*Timothe Bright. Doctor of Physicke,* London, 1911). Two aspects of his writings are considered in some detail: his invention of a shorthand, and the possible influence of his *Treatise of Melancholie,* 1586, on Shakespeare and on Burton. Regarding the latter, a recent study (Lawrence Babb, *Sanity in Bedlam,* 1959) refutes Sir Geoffrey's contention that it was considerable. The biographical sketch is followed by bibliographical descriptions of Bright's eight publications.

Edwin Clarke

A CORRECTION

In my review of Louis Kaplan's *Bibliography of American Autobiographies* in the October, 1962 issue of the *Journal* I listed six medical works not in the bibliography. Mr. Kaplan points out that the volumes cited were published after 1945, the date he mentioned in his introduction as the final year included. I regret this injustice to his excellent bibliography.

GERTRUDE L. ANNAN

BOOKS RECEIVED

Beecher, Henry K. and Ford, Charlotte. *A Bibliography of the Publications of the Anaesthesia Laboratory of the Harvard Medical School at the Massachusetts General Hospital.* Baltimore, The Waverly Press, 1962. xix, 54 pp., 1 illus.

Smythe, R. H. *Healers on Horseback.* Springfield, Illinois, Charles C Thomas, 1963. x, 135 pp. $5.00.

History of Science Society of Japan. *Japanese Studies in the History of Science. No. 1.* Tokyo, History of Science Society of Japan, 1962. 140 pp., illus. $5.00.

Krueger, Haven C. *Avicenna's Poem on Medicine.* Foreword by Ralph H. Major. Springfield, Illinois, Charles C Thomas, 1962. xiii, 112 pp., illus. $5.00.

Kolle, Kurt. *Grosse Nervenärzte.* Band 3. Stuttgart, Georg Thieme Verlag, 1963. Available in USA and Canada: Intercontinental Medical Book Corporation, New York 16, New York. vi, 228 pp., illus. DM 32.

Vasconcellos, Ivolina de. *Revista Brasileira de História da Medicina.* Vol. XII, Nos. 1-6. Rio de Janeiro, Instituto Brasileiro de Historia da Medicine, 1961. 184 pp., illus.

Pagel, Walter. *Das medizinische Weltbild des Paracelsus.* Wiesbaden, Franz Steiner Verlag GMBH, 1962. xvi, 160 pp.

Bologa, V. L. *Din Istoria Medicinii Romînești Și Universale.* Bucharest, Editura Academiei Republicii Populare Romine, 1962. 521 pp., illus.

Kock, Wolfram. *Medicinhistorisk Årsbok. Yearbook of the Medical-Historical Museum, Stockholm.* Stockholm, Medicinhistoriska Museet, 1962. 315 pp., illus. 18.

Stewart, Isabel M. and Austin, Anne L. *A History of Nursing.* 5th ed. New York, G. P. Putnam's Sons, 1962. x, 516 pp., 27 illus.

Hunter, Richard and Macalpine, Ida, eds. *A Treatise on Madness by William Battie, M.D. and Remarks on Dr. Battie's Treatise on Madness by John Monro, M.D. A Psychiatric Controversy of the Eighteenth Century,* London, Dawsons of Pall Mall, 1962. 50s.

Harper, R. M. J. *Evolution and Illness.* London, E. and S. Livingstone Ltd., 1962. U. S. Agent: The Williams and Wilkins Co, Baltimore, Maryland. vii, 108 pp., illus. $5.50.

Poynter, F. N. L. *The Journal of James Yonge, Plymouth Surgeon [1647-1721].* London, Longmans, Green & Co. Ltd., 1963; Hamden, Conn., Archon Books, 1963. 247 pp., 9 illus. $6.00.

Bonner, Thomas Neville. *American Doctors and German Universities. A*

Chapter in International Intellectual Relations, 1870-1914. Lincoln, Nebraska, University of Nebraska Press, 1963. ix, 210 pp. $4.25.

King, Lester S. *The Growth of Medical Thought.* Chicago, The University of Chicago Press, 1963. ix, 254 pp. $5.50.

Frey, Manfred. *Friedrich Miescher-His und sein Beitrag zur Histopathologie des Knochens.* Basel, Benno Schwabe and Co. Verlag, 1962. 112 pp. Sw. Fr. 16.-

Flerreira, Alarice do Amaral. *Anais Brasileiros de Ginecologia.* Vol. 54, Nos. 3 and 4. Rio de Janeiro, M. Monteiro de Barros, 1962. #3: 89-148 pp. #4: 149-206 pp.

Asimov, Isaac. *The Human Body—Its Structure and Operation.* Boston, Houghton Mifflin Co., 1963. ix, 340 pp., illus. $5.95.

Singer, Charles and Underwood, E. A. *A Short History of Medicine.* 2d ed. New York, Oxford University Press, 1962, 854 pp., illus. $10.00.

Wightman, W. P. D. *Science and the Renaissance.* New York, Hafner Publishing Co., 1962. 2 vols.

Hunter, Richard and Macalpine, Ida. *Three Hundred Years of Psychiatry 1535-1860.* New York, Oxford University Press. xxvi, 1107 pp., 204 illus. $13.45.

Anning, S. T. *The General Infirmary at Leeds.* Vol. I. Edinburgh and London, E. and S. Livingstone Ltd., 1963. xii, 107 pp., 46 illus.

Martinez Duran, Carlos. *Discursos Universitarios, 1958-1962.* (Universidad de San Carlos de Guatemala). Guatemala, Imprenta Universitaria, 1962. xxvi, 229 pp.

Fracastoro, Jeronimo. *Del Contagio, de las Enfermedades Contagiosas y su Curacion.* Anibal Ruiz Moreno, Tr. Santiago de Chile, Centro de Investigaciones de Historia de la Medicina de la Universidad de Chile, 1962. (Biblioteca de Clasicos de la Medicina). xxxi, 160 pp.

Anales Chilenos de Historia de la Medicina. Vol. 3, 1961. 461 pp.

Palla, Ákos, and others, Eds. *Nymphis Medicis.* Budapest, Medimpex, 1962. 143 pp., 70 illus.

Lind, L. R. *Aldrovandi on Chickens.* Norman, Oklahoma, University of Oklahoma Press, 1963. xxxvi, 447 pp., 48 illus. $6.95.

Beringer, J. B. A. *The Lying Stones,* being his *Lithographiae Wirceburgensis;* translated and anotated by Melvin E. Jahn and Daniel J. Woolf. Berkeley, California, University of California Press, 1963. xiv, 221 pp., illus. $6.50.

Coates, John Boyd, Jr., Ed. *Surgery in World War II. Vol. 1. Thoracic Surgery.* Washington, D. C., Office of the Surgeon General, Dept. of the Army, 1963. xxiv, 394 pp., 67 illus., 13 tables.

NOTES ON CONTRIBUTORS

L. R. C. AGNEW, A.M., M.D., is Professor of the History of Medicine in the University of Kansas, and Chairman of the Department. His address is the University of Kansas Medical Center, Kansas City 3.

JEANNE L. BRAND, Ph.D., is Scientist Administrator (Social Sciences), International Research Programs Section, Research Grants and Fellowships Branch, National Institute of Mental Health, Bethesda, Maryland.

EDWIN CLARKE, M.D., M.R.C.P., is Visiting Associate Professor of the History of Medicine, Yale University.

HARRY GRUNDFEST, M.D., is Professor of Neurology, Columbia University College of Physicians and Surgeons, 630 West 168th Street, New York 32.

ROGER GUILLEMIN is at the Laboratoire de Morphologie Experimentale et Endocrinologie, Collège de France, Paris.

F. R. JEVONS, M.A., Ph.D., is Lecturer in Biological Chemistry at the University of Manchester, Manchester, England.

BARTLETT C. JONES, Ph.D., is Assistant Professor of History, Sam Houston State Teachers College, Huntsville, Texas.

JEROME M. SCHNECK, M.D., is Clinical Associate Professor, Department of Psychiatry, State University of New York, Downstate Medical Center, New York. His office address is 26 West 9th Street, New York 11.

JERRY STANNARD, Ph.D., is Research Associate, Department of the History of Science and Medicine, Yale University.

Repair of Cleft Palate by Philibert Roux in 1819

A Translation of John Stephenson's *De Velosynthesi*

W. W. FRANCIS

With an Introductory Note by Lloyd G. Stevenson*

JOHN STEPHENSON (1797-1842) of Montreal was the first patient to be operated on for cleft palate by the famous Paris surgeon Philibert Roux in 1819. Stephenson described his own case, and the successful operation, in his graduation thesis at Edinburgh the following year, 1820. He named the operation with the expressive term *velosynthesis,* but Roux in his own account of the procedure, published only in 1825,[1] preferred the term *staphyloraphie.* Though the operation had been attempted by others, it was Roux's publication which brought it into current surgical use.

Stephenson subsequently became a leading surgeon in his native city and was the principal founder of the Montreal Medical Institution, out of which the Medical Faculty at McGill University developed. He was a prime mover in the establishment of the University, lectured on anatomy and surgery from 1823, and was appointed the first professor of anatomy in 1832.

The English translation of Stephenson's Latin thesis, here printed for the first time, was made by the late Dr. William W. Francis, the distinguished and well-known librarian of the Osler Library at McGill until his death in 1959.**

* Faculty of Medicine, McGill University, Montreal, Canada.

** This translation, prepared *con amore,* would have received a final polish from his hand had he lived. Mr. William LeFanu, Librarian of the Royal College of Surgeons of England, who was Visiting Librarian of the Osler Library during April and May 1963, very kindly checked it against the Latin text and made a number of improvements in the wording.

1 Roux, P. J. Mémoire sur la staphyloraphie, ou la suture du voile du palais. *Arch. gén. Méd.,* 1825, *7,* 516-538.

Copyright 1963 by JOURNAL OF THE HISTORY OF MEDICINE AND ALLIED SCIENCES, Inc.

Velosynthesis

A Graduation Thesis in Surgery, Submitted to the University of Edinburgh, 1 August 1820, for the Degree of M.D., by John Stephenson, of Canada, Surgeon, Member[2] of the Royal College of Surgeons, London, and of the Royal Medical Society Edinburgh. Edinburgh, printed by P. Neill, 1820.

—Quaeque ipse miserrima vidi,
Et quorum *pars magna* fui. Virgil.

This falls out better than I could devise. Shakespeare.

FOREWORD[3]

In publishing this, my first essay, with the consent of the University and to obtain the doctor's degree, I take the opportunity of expressing my humble thanks and of showing my appreciation of the place which has produced such famous men of science. A stranger, and now about to leave Scotland and the most learned University in Europe, which has taught me so much, I should be seriously neglecting my duty to you if I failed to describe this case hitherto unreported in surgical or medical literature. I offer it, therefore, as a small token of my great gratitude to you.

The report will be authentic for the subject is one which I perhaps am best qualified to discuss, since I am myself the patient. The absence of any writings on the subject adds to the difficulties of my thesis, but I have received most helpful notes from Dr. Roux, who led aberrant nature back into her proper course.

Il conçut, il remplit l'ensemble d'un ouvrage;
Il sut entremeler la leçon et l'image.
La Harpe.

[2] He calls himself "Soc.," usually translated as "Fellow;" but the fellowship, as at present constituted, dates only from 1843.

[3] Preceded by four dedications in the grand monumental Latin style: To his father, John Stephenson, Esq., of Montreal, as the first fruits of the scientific studies which he has so generously fostered; to his father's friend, William Logan, of Clarkson near Falkirk, for unforgettable kindness; to P. S. Roux, professor of surgery at the Ecole de Médecine and La Charité, Paris, with the greatest gratitude for many benefits, especially in September last; and to William Robertson, military surgeon and practitioner at Montreal, who taught him the rudiments of the art. Robertson was later co-founder with him of the McGill Medical Faculty.

This new and ingenious operation will perhaps guide skilful surgeons to other unknown procedures.

I hope that [my] Alma Mater will look with indulgence on my first paper.

My History from Birth to the Time of the Operation

Some account must be given of myself and of any disabilities before the operation. It will also serve to show my qualifications. I was born at Montreal, a city of North America, in January[4] on the coldest night of many years. I was healthy and fat at birth, but my mother noticed that though she had abundant milk not only did I not thrive but I soon began to lose weight, and that the milk flowed from my nostrils and wet the whole bed. A doctor summoned by my father made a cursory examination of the fauces and said the trouble was a fissure, the result of inflammation and ulceration caused by the intensely cold weather. In this he was wrong. For, in the first place, I know of cases in Scotland and France, countries warmer than Canada. Secondly, in my adolescence others, as well as I, most carefully examined my fauces and could see no loss of substance of the soft palate. Part of the velum would certainly have been eroded if there had been any ulceration, as the physician said. Thirdly, though formerly an excellent army surgeon, he was at that time old and feeble, and had pronounced the disease incurable after the most cursory inspection. Indeed, all the least authors, ancient and modern, have made the same mistake. Fourthly, one of my brothers was born with a cleft uvula. But in my case the soft palate as well as the uvula was involved in a vertical fissure of the whole median raphe. The two halves, habitually retracted by the continuous muscular action, presented a huge triangular opening with unobstructed communication between the pharynx and buccal cavity, and with the two halves of the uvula at the angles of the triangle whose apex was at the posterior junction of the palate bones. There was no fissure of the lip nor any other associated deformity. When my mother saw me gradually failing, she tried to discover some way of feeding me. Finally, she found that if she held me upright I rejected little or no milk, and thereafter I improved and gained in weight. But indeed she had trouble nursing me:

[4] He fails to give the year (1797) and, consequently, his age (22) at the time of operation.

A pensive anguish pining at the heart,
That noble wish, that never cloyed desire
Which, selfish love disdaining, seeks alone
To bless the dearer object of its flame.
Thomson.

For several years of my childhood I was not very robust, but became perfectly strong after the age of puberty. So late was I in learning to speak that my relations feared I would never acquire that faculty, and it was some years before I could say certain words distinctly. I always pronounced *th* like *s*. As I grew up, the adjacent parts tended to close the defect, and by speaking slowly I articulated better. Thanks to the nasal quality of the language I used to speak French more clearly than English. Nature is kind and trying to correct her mistakes, did her best to improve my unpleasant voice by contracting as strongly as possible the muscles of the naso-pharynx. That the voice is affected by the nasal cavities and soft palate is shown by the fact that mine resembled that of a venereal patient who has suffered the partial or complete loss of his palate. I seemed to speak through my nose. I believe that the nasal sound was due to faulty vibration of the air in its passage from lungs to nares, because the fissure prevented the soft palate from functioning, and, moreover, I could speak more clearly with my head bent back. All but my intimate friends had difficulty in understanding me. It was only when I had a cold in my head that my voice seemed different, though I could not describe the change; at other times it never sounded unpleasant to me, though if any one else's voice sounded nasal, I was immediately aware of its unpleasantness.

When I grew up, I had no trouble in eating or drinking with my body erect; it was only when I leaned forward that anything came through my nose. I was never able to drink from a spring lying down as boys often do. And there were more unpleasant difficulties. The worst was vomiting when the stomach contents would be expelled through my nose. I could not blow up a bladder nor play a pipe or any wind instrument, unless I closed my nostrils with my fingers. In my youth, without much professional experience, I had never heard of any way of curing my defect, nor have I ever found any light thrown upon it in medical literature.

I used to think there might be a way to repair the damage, but even so I never dreamed that any operation could be as successful as the one I am about to describe. There was scant hope that such

a congenital defect and its disabilities could be cured in a few days. Fearing that trouble was permanent, I bore it patiently.

"J'ai nourri mes chagrins sans les manifester."
Voltaire.

It may be asked why the British surgeons never spoke to me about such an operation. The answer is that all my medical friends suspected that my trouble was syphilitic; they had not examined my throat and so the condition of my soft palate was unknown.

"Tendresse dangereuse, autant comme importune" Corneille.

When in Paris in 1819 pursuing my professional studies, I was talking one day to Dr. Roux, most famous of French surgeons, about something quite unrelated to my affection. He suddenly took notice of the harshness of my voice and, rightly dropping his politeness, enquired if I had ever had a syphilitic ulceration of the palate, for there was no external signs of the disease; whereupon I showed him the lesion and explained it all. He immediately thought it operable and spoke to me of the possibility. In favour of the operation was the fact that certain movements of the fauces, as in holding the breath, would almost close the fissure. I weighed the possibilities and promised that he should operate on my velum, but since I was about to leave France and make a long journey, I would put it off till my return to France the next year. Meanwhile, my medical friends persuaded me to have the fissure treated without delay. And so, after due consideration, I yielded; for, in the first place, Dr. Roux having suggested the procedure would do his best. Secondly, I had nothing to lose but if it turned out well everything to gain. Thirdly, if the operation was not entirely successful, another might be advisable and a whole year would not have to lapse before the attempt. And fourthly, many hazards, such as war, might interfere with my returning to Paris and with this skilful surgeon earning another well-merited laurel. So two days later I again saw Dr. Roux and told him I wanted the operation done. I wasted no time before getting through with it, for it was done the next day.

No one had ever thought about the procedure; complete fissure of the soft palate had always been considered incurable, and the afflicted were doomed to endure this deformity and its consequences. Dr. Roux believed it could be cured by using the hare-lip suture and keeping the parts immobile for some days. The operation lasted nearly an hour and needed all his skill and all my

endurance for its successful performance. I suffered less from the pain than from the irritation and tickling caused by the introduction of the needles, a sensation that would run up to the ear like the pain of toothache. This would seem to show that, in some people at least, the fauces are not very sensitive.

ACCOUNT OF THE OPERATION

It was carried out on the 28th of last September (1819) shortly after 4 p.m. I adopted a sitting position which seemed best to facilitate breathing and the flow of blood out of the mouth and to get as much as possible of the very necessary light. Three interrupted *sutures,* stout enough to avoid laceration of the tissues, as far as possible, were introduced with two surgical needles alternately from behind forwards, each suture being thus drawn three times. Since fingers are too short to do the work at such depth and the needles were rendered slippery by the constant flow of saliva, use was made of a stylus-like instrument, *porte-aiguille* in French, with what we call in English a slider to grasp the needles. Before the edges were freshened the sutures were put in place in order to see whether the fissure could be closed. It would have been unfortunate to do the cutting to no purpose, for then the defect would only have been enlarged. The edges were thereupon cut with forceps and a guarded scalpel. The sutures were separately tied and severed. These ligatures had been placed in position before the incision not only to see that the fissure could be closed, but also because the oozing of blood from the freshened edges, especially in the next stage, would have been troublesome both to the operator and to me. The union seemed to be as firm as skill could make it, and nature's healing inflammation would perfect the cure. The halves of the uvula were not sutured, so I still have two uvulas. Immediately after the operation I gratified a certainly unwise but perhaps pardonable curiosity by pronouncing a few words for Dr. Roux and the others. All agreed that there was a great change in my voice.

AFTER HISTORY OF THE SUCCESSFUL OPERATION

There was little pain but some feeling of tension the first two nights. Respiration was difficult, as I had to keep my mouth closed thereby increasing the painful tension, and for four days I breathed entirely through the nose. For twenty-nine hours I had no food or drink, and then only a little bouillon conveyed into my

oesophagus with a spoon. No solid food for four days. After seventy-two hours, the middle suture was taken out, and union seemed firm. Dr. Roux wanted to remove the superior one, but another physician[5] and I persuaded him to leave the other sutures. (1) Success depended entirely on adhesive inflammation and union. (2) There were no analogous cases with which to compare ours. (3) The muscular action of these parts is very strong. Nevertheless I now think that all the sutures should have been cut at that time, or at any rate the superior section along with the median. What relief from painful tension the cutting of a suture afforded. The velum thereupon acquired its motility and elasticity. Eighty-four hours after the operation the other two sutures, the superior and inferior, were cut in the presence of Dr. Boyer. We were delighted to find the *synthesis* firm. I was now free to talk, and the next day I took some solid food, chewing it carefully. The parts gradually strengthened and on October 11, at Dr. Roux's request, I had the honor of reading a report of my case before the Royal Institute of Paris. The next day I left Paris and after a long journey by land and sea without any harm, I reached Edinburgh. All my medical friends said that my voice was now more distinct, stronger, and more normal. I myself noticed a change in my voice but could not define its nature. It must be confessed that some of the nasal quality is still present. Old habit and the above-mentioned muscular contraction were too much for me. The repaired instrument is not yet fulfilling its proper duties nor giving the help it should to my vocal faculty. Who can deny the all-importance of habit? Do we not have fixed hours for getting up in the morning and going to bed at night, and our cattle for setting out and returning home? People sometimes show habit spasms, an affliction which is difficult to be rid of, if of long standing. Often our duties are carried out unconsciously; and here habit certainly comes in. In short, many of our actions are habits. If it is so difficult to correct unpleasant habits which have been acquired almost mechanically, certainly it is much more difficult to avoid a habit which is beyond our control. All the same I have hopes of great improvement. For Demosthenes in his youth articulated so indistinctly that scarcely could he pronounce his own name, and yet constant practice made him the greatest of Greek orators. And so I myself shall practise persistently and patiently. For there is no

[5] Holmes? [i.e. Andrew F. Holmes (1797-1860), M.D. Edin. 1819, afterwards Professor of Medicine at McGill, and first Dean of its Medical Faculty].

denying that eloquence can be achieved, or that it is important not only to the orator but even in our profession. It was by eloquence that Demosthenes at Athens and Cicero at Rome attracted public confidence and approval; and similarly in our days William Pitt and Charles Fox became celebrated. Perilous and difficult undertakings are carried out with its aid; the preacher turns our hearts towards virtue; the general incites his soldiers to battle and other risks of war; the lawyer pleads his cause better, and obtains public approval; the statesman triumphs in council; and the ambassador best serves the interests of his country abroad; and finally, this art enables a man to defend the just and the honest and to protect the honor, life and goods of his fellowmen. Eloquence is important not only in the above connections but throughout one's whole life. Thereby the traveller learns easy and pleasant manners, displays an excellent and scientific education, and his conversation, whether grave or gay, is helpful. For praise or blame, to drive away sadness, to appease wrath, curb pride or any other passion, recourse should be had to eloquence. Such facilities are more easily acquired by the means of eloquence than by any others. Who does not covet such gifts?

Many disabilities I have got rid of: I can now drink perfectly well in a horizontal position; can play on hitherto noiseless wind instruments, and have lost that very disagreeable habit, when vomiting, of expelling stomach contents through my nose. I learned this in October last, when crossing from Ostend to Dover on the 22nd day after the operation; though I was seasick and vomiting nothing entered my nose. This also proved that the union was a solid *synthesis* for, as all surgeons know, vomiting throws the velum into violent motion. For a time I could not whistle. Sometimes the *uvula* would give rise to an irritation and cough, or there would be a pain running up to the ear, something like a toothache, and possibly a sequel to the operation. I am no longer thus affected.

COMMENTS ON THE OPERATION

Although the operation, considering the circumstances and the haste, was very well carried out by Dr. Roux, I would respectfully suggest some modifications. The chief trouble was caused by the instrument called a *slider;* its handling was so difficult that one needle was broken and another had to be introduced. If the edges of the instrument are closed by a *cochlea,* I think this disadvantage

will be avoided. When at my suggestion the edges were thus opened and closed, the parts of the instrument did not shake. Secondly, since muscular action is intense in the velum, and the sutures, as in my case, are so prone to lacerate the tissue that Dr. Roux had difficulty removing these deeply buried ligatures, especially the last one, I would make the following suggestion: Gum elastic, light at the back, thicker in front, should be placed between the velum and the sutures and then the threads should be tied over the elastic as in the suture called quilled [quilted?] in English, when the edges of the fissure have been tightly joined together without anything intervening. Other materials may perhaps be substituted for gum elastic.

It is of great importance that the ligature be fine but widely spaced so as not to lacerate the tissue nor to excite the sometimes dreaded suppuration. The sutures should enclose as much of the velum as possible. Let the patient drink and eat as little as possible, or even let him take his nourishment through a tube or the skin of an eel introduced into the oesophagus as John Hunter recommended in certain cases. But there are many disadvantages and in some cases danger in these methods, therefore I would advise my own method, described above, if feeding is particularly difficult. Absolute silence should be observed in all cases and this is easy in adults. Other regimen is rarely necessary unless there be complications, such as convulsions in children, when the treatment is then adapted to each case.

General Remarks

In the pages I have so far filled it is shown that, first, a vertical fissure of the soft palate, extending through the whole or a part of the median raphe, can be united by adhesive inflammation. Secondly, that the sutures used by Dr. Roux, whether or not preceded by my modifications, would seem to be the only simple, certain and efficacious method; for no plasters or other applications, as in fissure of the lip, are here called for. Thirdly, it would seem that some operations hitherto unattempted by the most skilful surgeons could now be performed without fear or risk in several varieties of the condition called hare-lip in English, whether confined to the upper lip or extending through the lip and hard and soft palate. After the usual operation for fissure of the lip, the edges of the hard palate often close up spontaneously, but the mobility and muscular action of the velum keep its edges apart.

All writers have agreed that this condition is incurable, whereas all such fissures can be closed by the above method. Sometimes in the unhappy victims of venereal proclivities, or of too-vigorous mercurial treatment, part or even the whole substance of the velum is seen to be destroyed; in some cases is not the defect narrow enough to be closed by sutures, thereby giving back to the patient his normal voice? Another inference: where the fissure is perhaps so wide that such suturing does not suffice, flaps might be cut from adjacent tissue on each side which could then be sutured to close the gap.

Lastly, some similar method may now be used in different cases for removing obstructions such as a polyp or irritating foreign body in the nose, so situated as to require operation. The velum may even be divided and then resewn in certain [cases] where that would help. Many other advantages may thus result.

MOST SUITABLE AGE FOR OPERATION

The operation is not possible in childhood. In the first place the child is too restless for the operation to be done without danger. Secondly, I think, from my own experience, that a child would suffocate if its nasal cavities filled with mucus; if my nose had been obstructed at the time, I am sure that the sutures could hardly have remained in place. Thirdly, children are liable to *tetanus* and other complications after any wounds; certainly they would be very liable to such symptoms after operation on a sensitive part. Fourthly, children cannot avoid crying, and the crying caused by more or less acute pain and tension will perhaps entail a less successful result. Lastly, the age of choice is, in my opinion, between the 4th and 6th year, when the child is less sensitive than before and less powerful than later. In any case I strongly advise that the operation be done before puberty to avoid all the disadvantages of habit.

ON THE FREQUENCY OF THE CONDITION

Although not very common, my deformity is not rare; several cases being recorded in medical literature. In the great Boerhaave's lectures reported by his distinguished pupil Haller, vol. 1, section 70, one case of fissure of the velum is described. The deformity, I believe, was in the velum, for it is in the section on diseases and deformities of the velum, and he says that the child could not drink, eat, or speak unless his head was retracted and his

nostrils closed with the fingers. Light is thus thrown on the cause of the muscular contraction in adults so affected. Dr. Roux saw one case before mine, and Dr. Dupuytren, the Paris surgeon, another a few weeks before my operation, but without any thought of suturing or other measures. My friend Lizars, extramural professor of anatomy and physiology at Edinburgh, had a case (which I saw) with the fissure extending through upper lip, hard and soft palate, and uvula. I know of two cases in Canada, but with cleft uvula only, one in a friend of mine, the other in my brother. My friend stuttered a little and some people thought this was caused by the fissure; but many without this deformity stutter, and others with it pronounce their words distinctly. My brother spoke perfectly clearly. All my other relations were born without any deformities. In the Edinburgh Infirmary at present there is a case of syphilitic fissure extending through the velum.

Believing that this new operation needs a name, I suggest Velosynthesis, a term derived from both Greek and Latin.

Social Attitudes to Irrationality and Madness in 17th and 18th Century Europe*

GEORGE ROSEN**

IN 1785 Jean Colombier, inspector-general of French hospitals and prisons, summed up the situation of the mentally ill in a succinct, devastating statement. "Thousands of lunatics," he wrote, "are locked up in prisons without anyone even thinking of administering the slightest remedy. The half-mad are mingled with those who are totally deranged, those who rage with those who are quiet; some are in chains, while others are free in their prison. Finally, unless nature comes to their aid by curing them, the duration of their misery is life-long, for unfortunately the illness does not improve but only grows worse."[1] The validity of this picture is generally supported by other contemporary evidence.[2] Indeed, one historian of psychiatry was led to conclude from such evidence that up to the end of the eighteenth century there were no real hospitals for the care and treatment of the mentally ill, only "places where they were *kept*. . . ."[3] Moreover, he attributed the sad lot of the mentally ill to a psychological factor, to the view that they were "step-children of life," a social attitude which survived in the community as an atavistic inheritance from the primitive past.[4]

Yet the situation was not so simple, nor can it be explained solely in terms of an atavistic but potent psychological factor which has operated through the ages. Various sources clearly indicate that not all those who were mentally or emotionally disturbed were treated in the manner described by Colombier. At the very same time there were to be found in Paris, on the street or in cafés, individuals whose peculiarities of dress or behavior did not

*Presented 7 December, 1962 as the twenty-seventh Beaumont Lecture, Yale University School of Medicine. This study was financed by grant M-3171 from the National Institute of Mental Health, U. S. Public Health Service.

**School of Public Health and Administrative Medicine, Columbia University.

1 René Semelaigne. *Les pionniers de la psychiatrie française avant et après Pinel.* Paris, J. B. Baillière et Fils, 1930. 2 vols., vol. I, p. 85.

2 *Procès-Verbaux et rapports du Comité de Mendicité de la Constituante 1790-1791,* publiés et annotés par Camille Bloch et Alexandre Tuetey. Paris, Imprimerie Nationale, 1911, pp. 604-605, 624-626, 762; Alexandre Tuetey. *L'assistance publique à Paris pendant la révolution.* Paris, 1895. 4 vols., Vol. I, *Les hôpitaux et hospices, 1789-1791,* p. 261.

3 Gregory Zilboorg. *A history of medical psychology.* New York, W. W. Norton & Co., 1941, pp. 312-313.

4 *Ibid.,* p. 312.

attract undue notice. Without much astonishment, Sebastien Mercier encountered a crack-brained maker of projects in a coffeehouse, simply remarking that there were others like him who had the public weal at heart "but who unfortunately were addlepated."[5] Diderot's brilliant portrayal of Rameau's nephew presents another social deviant who is a strange mixture of good sense and folly. Delineated with great acuteness and intelligence, he was, according to Diderot, "one of the most bizarre fellows in a country where God has seen to it that there is no lack of them."[6]

Mentally disturbed individuals occur as social personages, as distinctive characters on the social landscape not only in the later eighteenth century but in earlier periods as well. Consciousness of public responsibility for the mentally deranged was limited in the medieval period. Custody of the mentally ill generally rested with their relatives and friends; only those who were considered dangerous or socially disturbing were dealt with by the community. In some places it was customary to receive persons who were acutely disturbed and agitated into general hospitals.[7] Harmless lunatics were permitted to roam the streets and roads; others were whipped out of town.

William Langland described the "lunatick lollers" wandering over the countryside and referred compassionately to their sad state.[8] Another instance in point was depicted by Thomas More in 1533. Writing of a poor lunatic, he stated that he was

> one which after that he had fallen into these frantick heresies, fell soon after into plaine open franzye beside. And all beit that he had therefore bene put up in Bedelem, and afterward by beating and correccion gathered his remembraance to him and beganne to come again to himselfe, being thereupon set at liberty, and walkinge aboute abrode, his old fransies beganne to fall againe in his heade. I was fro dyvers good holy places advertised, that he used in his wandering about to come into the churche, and there make many mad toies and trifles, to the trouble of good people in the divine service, and especially woulde he be most busye in the time of most silence, while the priest was at the secrets of the masse aboute the levacion . . . whereupon I beinge advertised of these pageauntes, and beinge sent unto and required by very devout relygious folke, to take some other order with him, caused him, as he came wanderinge by my doore,

5 Sebastien Mercier. *Tableau de Paris.* Hamburg and Neuchatel, 1781, pp. 103-104.

6 Diderot. *Oeuvres,* Texte établi et annoté par Andre Billy. Paris, Bibliothèque de la Pléiade, 1951, p. 425.

7 E. Coyecque. *L'Hôtel-Dieu de Paris au moyen age. Histoire et documents.* Tome I. *Histoire de l'Hôtel-Dieu. Documents (1316-1552)*, Paris, H. Champion, 1891 p. 109; R. M. *Clay. The medieval hospitals of England.* London, Methuen & Co., 1909, pp. 33-24; Alfons Fischer, *Geschichte des deutschen Gesundheitswesens,* Berlin, F. A. Herbig, 1933, 2 vols., vol. I., pp. 77-78.

8 William Langland. *The vision of William concerning Piers the plowman.* edited . . . by Walter W. Skeat. Oxford University Press, 1954. 2 vols., vol. I, pp. 235-237.

to be taken by the counstables and bounden to a tree in the streets before the whole towne, and ther they stripped [striped] him with roddes therefore till he waxed weary and somewhat lenger. And it appeared well that hys remembraunce was goode ineoughe save that it went about in grazing [wool-gathering!] til it was beaten home. For he coulde then verye wel reherse his fautes himselfe, and speake and treate very well, and promise to doe afterward as well. And verylye God be thanked I heare none harme of him now.[9]

A characteristic group among the vagrants and wandering beggars of Tudor England were the Abram-men or Toms o'Bedlam. They were patients discharged from Bethlehem Hospital, sometimes not entirely recovered, who were licensed to beg. As a means of quickly identifying those allowed to solicit arms, they wore a metal plate as a badge on the left arm.[10] The Bedlam beggars were a familiar sight throughout England until well into the later seventeenth century. According to John Aubrey,

Till the breaking out of the Civil Warres, Tom o'Bedlams did travell about the countrey. They had been poore distracted men that had been putt into Bedlam, where, recovering to some sobernesse, they were licentiated to goe a-begging . . . they wore about their necks a great horn of an oxe in a string or bawdric, which, when they came to an house for almes, they did wind, and they did put the drink given to them into their horn, where they did put a stopple.[11]

Some of these beggars were undoubtedly impostors, and by 1675 the license to beg had been revoked. The ubiquitous presence of these vagrant mental patients is fully reflected in the literature of the Elizabethan and early Stuart periods. Illustrative are the close of the third scene in the second act of *King Lear* when Edgar announces his intention of becoming a Bedlam beggar, and the mad songs, "Loving Mad Tom," and "Old Tom of Bedlam."[12]

II

Social attitudes toward the mentally and emotionally disturbed have clearly not been uniform at all times but have exhibited modulations and nuances. During the medieval period and the Renaissance, forms of unreason were considered fundamental ele-

[9] D. Hack Tuke. *Chapters in the history of the insane in the British Isles.* London, Kegan Paul, Trench & Co., 1882, pp. 56-58.

[10] A badge for beggars was introduced by Gloucester in 1504. See J. H. Thomas. *Town government in the sixteenth century.* London, George Allen & Unwin, 1933, pp. 115-116.

[11] J. Aubrey. *Natural history of Wiltshire.* Britton, Ed., Wiltshire Topographical Society, 1848, p. 93.

[12] Robert Graves. *The crowning privilege,* Harmondsworth, Middlesex, Penguin Books, 1959, pp. 247-266; Percy's *Reliques of ancient English poetry.* Everymans Library. New York, E. P. Dutton, 1906, 2 vols., vol. II, pp. 148-150.

ments in the fabric of the universe and of man. Medieval men believed that there were compelling forces making for righteousness and perfection, not only within the individual but as well in nature. Moreover, there were norms in nature which should not be violated, for their transgression led to vice. The later Middle Ages, particularly from the thirteenth century onward, placed madness in the hierarchy of the vices. Another view of mental derangement is implied by the passage in the Prologue of *Piers Plowman* where a lunatic speaks up to praise the ideal king, while an angel speaks from heaven.[13] The implication that only madmen and angels can speak the truth is related to the idea of holy madness, the idea that the ultimate of Christian truth is revealed to Christ's fools, to those who throw themselves utterly on God.[14] Actually this view is very old and is based on the *New Testament* (I Corinthians 1.18 ff.).

Numerous students of the waning Middle Ages have commented on the feeling of melancholy and pessimism which marked the period.[15] A sense of impending doom hung over men and women intensified by a belief that the end of time was approaching and that the last days were at hand. Nor was this apocalyptic sense of anxiety and urgency unjustified. A world was indeed disintegrating, and in its midst a new order, the shape of which could be seen only dimly, was agonizing toward birth. The feudal order was yielding to absolute monarchy and the early nation state. The all-embracing Christian commonwealth, fashioned and guided by the Church of Rome, was wracked by dissension, hatred, and violence. Abuses in the Church brought forth a desire to return it to its pristine state, to a new birth of life.[16] The need for renewal was felt by many, and to perceptive men the troubles of the time were evidence that the age was at hand which would usher in the Last Judgment. The prevalence and spread of heresy, popular mysticism and personal piety in the later fourteenth and fifteenth centuries were hardly an accident. History was moving toward re-

[13] Langland, *op. cit.*, p. 12.

[14] Natalino Sapegno. La "santa pazzia" di Frate Jacopone e le dottrine dei mistici medievali, *Archivum Romanicum*, 1923, 7, 349-372.

[15] Rudolph Stadelmann. *Vom Geist des ausgehenden Mittelalters*. Halle a S., Max Niemeyer Verlag, 1929, p. 7; Johan Huizinga. *The waning of the Middle Ages*. Garden City, Doubleday, 1954, pp. 31 ff.; W. E. Peuckert. *Die grosse Wende: Das apokalyptische Saeculum und Luther*. Hamburg, Claasen & Goverts, 1948, pp. 103-106, 148-191.

[16] Friederich Herr. *Aufgang Europas: Eine Studie zu den Zusammenhängen zwischen politischer Religiosität, Frömmigkeitstil und dem Werden Europas im 12. Jahrhundert*. Wien-Zürich, Europa Verlag, 1949, pp. 384-575; Herbert Grundmann. *Religiöse Bewegungen im Mittelalter*. 2. verbesserte und ergänzte Auflage. Hildesheim, Georg OlmsVerlagsbuchhandlung, 1961; Newton W. Bloomfield. *Piers Plowman as a fourteenth century Apocalypse*. New Brunswick, N.J., Rutgers University Press, 1961.

newal and divine fulfillment, and men looked for signs and interpretations that warned sinners and encouraged the just.[17]

Within this context madness through its linkage with the revelation of religious truth became a means of achieving knowledge. Madness was a primitive force of revelation, revealing the depths of menace, destruction, and evil that lurked beneath the illusory surface of reality. Unreason revealed the unbearable, the things in the world upon which one could not otherwise bear to look. Madness was on the increase, clearly a sign that the end of the world was at hand. But it was also a cause, for human folly had unleashed forces of disorganization and destruction that could end only in ultimate catastrophe. These forces were loose in a world that had succumbed to self-delusion, a world grown callous, hard-hearted, and rotten with selfishness, where people maddened with fear were pressed to the very brink of existence, a world which must therefore inevitably end in frenzied self-destruction. This theme of cosmic madness is a major element in the art and literature of the fifteenth and sixteenth centuries. Grünewald's Temptation of St. Anthony, the Lisbon painting by Bosch on the same subject, as well as his Millennium, provide evidence on this point. Writers as diverse as Pierre Ronsard and Sebastian Brant dealt with madness as a cosmic phenomenon, as a cause of the troubles which seemed to herald the end of the world. Ronsard combined these ideas in his *Discours des misères de ce temps,* denouncing the senseless errors of belief that turned the world upside down so that reason and justice were replaced by violence, hate, and death, and even God was no longer secure in his own dwelling. Similarly, the episode in Brant's *Narrenschiff,* where a furious storm drives the ship off its course and wrecks it, symbolized a world driven mad and its coming catastrophic end.[18]

Irrationality personified in the figure of Folly loomed large in the Renaissance, but there was little discrimination between

17 Rupert Taylor. The political prophecy, in England. New York, 1911; Jeanne Bignami-Odier. *Etudes sur Jean de Roquetaillade (Johannes de Rupescissa)*. Paris, 1952; Morton W. Bloomfield. Joachim of Flora: a critical survey of his canon, teachings, sources, biography and influence. *Traditio,* 1957, *12,* 247-311; Henry Bett. *Joachim of Flora.* London, Methuen & Co., 1931. Morton W. Bloomfield and Marjorie Reeves. The penetration of Joachism into northern Europe. *Speculum,* 1954, *29,* 772-793 [778 ff.].

18 Nikolaus Pevsner and Michael Meier. *Grünewald.* New York, Harry N. Abrams, 1958, pp. 108, 116-122; Jacques Combe. *Iheronimus Bosch.* Paris, Pierre Tisné, 1946, pp. 44-67; Wilhelm Fraenger. *Hieronymus Bosch. Das Tausendjährige Reich. Grundzüge einer Auslegung.* Coburg, Winkler Verlag, 1947; Sebastian Brant. *Narrenschiff,* herausgegeben von Friederich Zarncke. Hildesheim, Georg Olmsverlagsbuchhandlung, 1961, pp. 98-100; Pierre Ronsard. *Oeuvres complètes* (Bibliothèque de Pléiade). Paris, Gallimard, 1950, 2 vols., vol. 2, p. 548.

species of folly. Erasmus speaks of foolish persons and of the insane without clearly differentiating between them. He has Stultitia remark that the latter are the happiest of all; perhaps he was referring to harmless deranged folk, perhaps to mental defectives. In large measure this identification of stupidity with irrationality reflects an attitudinal shift from the idea of madness as a cosmic phenomenon to the view that madness is born in the hearts of men. Sebastian Brant published his highly popular satire, *Das Narrenschiff,* in 1494. In it he pilloried the follies connected with a whole gamut of human activities. Irrational desires and behavior become objects of ridicule in this context and are exposed to the laughter and scorn of the world. Folly is no longer a vice and a punishment, but only a defect of human nature appropriate for castigation by the moralist. For Erasmus, irrationality is no longer a menace but a necessity to make the wheels of the world go round. In the *Encomium moriae,* which appeared in 1511, Folly wearing a fool's cap and bells points out how prosaic is her rule in the affairs of mankind.

Even religion seems to have some affinity with a certain kind of folly. Did not Paul say, "The foolishness of God is wiser than men?" This touches on the old Christian theme that the world is folly in the eyes of God, a theme that was revived in the sixteenth century and explored by thinkers as different as Calvin and Sebastian Franck. According to Calvin,

> as long as our views are bounded by the earth, perfectly content with our own righteousness, wisdom and strength, we fondly flatter ourselves, and fancy we are little less than demigods. But, if we once elevate our thoughts to God, and consider his nature, and the consummate perfection of his righteousness, wisdom, and strength, to which we ought to be conformed—what before charmed us in ourselves under the false pretext of righteousness, will soon be loathed as the greatest inequity; what strangely deceived us under the title of wisdom, will be despised as extreme folly; and what more the appearance of strength, will be proved to be most wretched impotence.[19]

When compared to the limitless reason of God, human reason is fallacious and irrational. Man can endeavor to reach God by breaking the chains which bind his spirit and thus escaping into the liberty of other-worldliness. However, in so doing he fathoms the depths of unreason and enjoys the highest wisdom. Heavenly bliss is the greatest madness, and is achieved when man transcends

[19] John Calvin, *Institutes of the Christian religion.* Grand Rapids, Michigan, William B. Erdmans Co., 1949, 2 vols., vol. I, pp. 48-49.

the gap between the things of this world and their divine essence, when he reconciles the cruel contradictions which God created.[20]

Thus, in the sixteenth century, from the humanistic as well as from the Christian viewpoint, irrationality is not regarded as having any absolute existence in the world. Folly exists only in relation to some form of reason, whether it be that of God or of man. Indeed, folly itself becomes a form of reason, even though distorted. ". . . Reason has taught me," wrote Montaigne, "that to firmly condemn something as false and impossible is to assume that one knows the bounds and limits of God's will and of the power of our Mother Nature; and that there is no more notable folly than to reduce these things to the measure of our capacity, and self-conceit."[21] "Men fail to recognize the malady of their mind. It does nothing but pry and seek, and keeps spinning about incessantly, constructing and becoming enmeshed in its own work, like our silkworms, and is suffocated in it. *A mouse in pitch.* It thinks that it sees from afar some apparent gleam of imaginary light and truth; but while it is running to it, so many difficulties, obstacles, and new quests cross its path that they mislead and intoxicate it."[22]

Folly and madness had become integral elements of the world of people and things. It is certainly no coincidence that the literature of the late sixteenth and early seventeenth centuries is so rich in the portrayal of distraught and insane characters. Quixote, Lear, Ophelia are simply among the best known in a gallery of characters to be found in such diverse sources as the plays of Fletcher, Dekker, Webster, Ford, Jonson, and other Elizabethan and Jacobean writers, the novels of Rabelais and Scudéry, or the folk-book recounting the exploits of Tyll Ulenspiegel.[23] All of them are in some way an endeavor to understand human nature and behavior, to answer the question "What is man and what is wrong with him?" In this effort various writers developed comprehensive analyses of the defects and perversities that were felt to underlie and to determine human behavior. The Jacobean stage is particu-

20 Sebastian Franck. *Paradoxa,* eingeleitet von W. Lehmann, herausgegeben von Heinrich Ziegler. Jena, Eugen Diederichs, 1909, pp. 87-88, 121-125; Johannes Tauler. *Predigten,* übertragen und herausgegeben von Dr. Georg Hofmann. Freiburg, Herder, 1961, pp. 309-310, 313.

21 Montaigne. *Essais* (Bibliothèque de la Pléiade). Paris, Gallimard, 1950, p. 214.

22 *Idem,* p. 1198.

23 Mönkemöller. *Geisteskrankheit und Geistesschwäche in Satire, Sprichwort und Humor.* Halle a S., Carl Marhold, 1906, pp. 141-162; Robert Rentoul Reed. *Bedlam on the Jacobean stage.* Cambridge, Mass., Harvard University Press, 1952; Lawrence Babb. *The Elizabethan malady. A study of melancholia in English literature from 1580 to 1640.* East Lansing, Michigan State College Press, 1951.

larly illuminating in this respect. Not only did the interpretations of the Jacobean playwrights reflect their psychological attitudes to the world in which they moved, but as well the views, the attitudes of this world to folly and madness. They were close to the emotional pulse beat of their contemporaries, and the theatrical presentation of individual and group madness was not solely a popular spectacle to attract the crowd. The presentation of Bedlam and its inmates on the stage indicates acceptance of madness within a socially admissible framework, one which combined the elements of the real hospital known to the London audience with the literary theme of the fools' hospital which appeared hardly more than a century after the arrival of the ship of fools.[24]

While Garzoni's hospital of incurable lunatics of 1586 still has some affinity with the ship of fools, it is symbolic of a social environment which was coming into being and which was to prevail until well into the eighteenth century. Fools bound for Narragonia were to be brought into port and after debarkation lodged in accommodations regarded as appropriate for them. Folly and madness were no longer to roam aimlessly. Order was necessary, and the mentally and emotionally deranged were to be subjected to discipline in institutions created for this purpose. For the seventeenth and eighteenth centuries, mental illness was to be exiled from the social scene in both thought and practice.

III

The shift in social attitudes toward mental illness which took place in Europe at this time can be analyzed and explained in terms of socio-economic, philosophical, and moral factors. Furthermore, this attitudinal change is closely linked with the character of the institutions developed and used during the seventeenth and eighteenth centuries for the mentally and emotionally deranged. These institutions must be seen first in relation to the evolution of the hospital. At various periods in history the need to care for the needy and the dependent, the sick and the disabled, has crystallized sufficiently in terms of attitude, theory, and practice so that one may speak of characteristic institutional models. In this sense, the history of the hospital may be seen in terms of certain types that have predominated in given historical periods.[25] While knowl-

[24] Tomaso Garzoni. *L'Hospidale de 'Pazzi incurabili.* . . Ferrara, 1586. I have used the Venice reprint of 1617.

[25] George Rosen. The hospital: historical sociology of a community institution in: *The hospital in modern society,* Eliot Freidson, Ed., Glencoe, Ill., Free Press, 1963 (in press).

edge concerning the healing shrines and the secular healing institutions of antiquity is not complete enough to be generalized, this is not the case for the medieval period. The medieval hospital in all its varied forms was essentially an ecclesiastical institution, not primarily concerned with medical care. This type was eventually replaced in the sixteenth century by another kind of hospital whose goals were not religious but primarily social. That is, the hospital from the sixteenth into the nineteenth century was intended chiefly to help maintain social order while providing for the sick and the needy. To achieve this aim the medieval hospital was to a large extent secularized, placed under governmental control, and its activities were accepted as a community responsibility.

From the thirteenth century onward the hospital had begun to come increasingly under secular jurisdiction. As cities in Europe prospered, and the bourgeoisie grew wealthy and powerful, municipal authorities tended to take over or to supplement the activities of the church. In part this was politically motivated, a desire of the civil authorities to be independent of clerical domination or to render the ecclesiastical power subordinate to themselves. This does not mean that the clergy were eliminated. Monks and nuns continued to provide nursing care as they had done before. Administratively, the municipal authorities were responsible for the hospital facilities, but the church might participate in some way.[26]

Secondly, hospitals and related establishments were considered increasingly inadequate to deal with situations in which problems of health and welfare were considered from a new viewpoint. From the medieval standpoint the poor, the sick, and the infirm might almost be considered necessary for the salvation of the donor of charity. They did the almsgiver a service. Such an attitude, however, accepted the beggar as a necessary part of society and tended to encourage begging. Small consideration was given to bettering the condition of the poor and the infirm. During the late Middle Ages, and especially following the Reformation, the whole approach to this problem changed.[27]

[26] Martha Goldberg. *Das Armen- und Krankenkassenwesen des mittelalterlichen Strassburg* (Freiburg Dissertation). Strassburg, 1909, p. 2; E. Becker. Geschichte der Medizin in Hildesheim. *Archiv klin. Med.*, 1899, *38*, 317; Siegfried Reicke. *Das deutsche Spital und sein Recht im Mittelalter* (Kirchenrechtliche Abhandlungen). Stuttgart, 1932, pp. 93-97; Wilhelm Liese. *Geschichte der Caritas.* Freiburg i. B., 1922, 2 vols., vol. I, pp. 231ff; A. deCalonne. *La vie municipale au XV^e siècle dans le nord de France.* Paris 1880, p. 126; D. P. Oosterbaan. *Zeven Eeuwen. Geschiednis von het oude en nieuwe Gasthuis te Delft.* Delft, 1954, pp. 86-133.

[27] Charlotte Koch. *Wandlungen der Wohlfahrtspflege im Zeitalter der Aufklärung* (Erlangen Dissertation). Erlangen, 1933, pp. 11-29.

Though the causes of poverty changed but little from the thirteenth to the sixteenth century, economic and social circumstances altered their significance and intensified their impact. As a result the condition of the poor, which was bad in the earlier period, had become increasingly worse by the early sixteenth century. Increased unemployment, higher prices, enclosures of peasant lands and related factors brought into being the problems of unemployment, vagrancy, and beggary which confronted governments from the fourteenth to the eighteenth centuries. Vagrancy appeared in the Netherlands and Germany even earlier than in England and France and then assumed increasingly large dimensions in all countries. In their endeavors to eke out a livelihood many vagrants pretended to be crippled or diseased so as to be able to beg with impunity and to obtain admission to a hospital. Some were professional beggars, frequently organized in gangs, such as those that frequented the *Cours des miracles* in Paris.[28] There is little doubt that the large number of poor and sick wanderers overtaxed the facilities available in various communities. Furthermore, whether or not these vagrants were sick, there was a great deal of economic and social distress by the sixteenth century, and the problem was what to do about it. As Simon Fish put the case in 1529 in his famous *Supplicacyon for the Beggars*: "But whate remedy to releve us your poor sike lame and sore bedemen? To make many hospitals for the relief of the poore people? Nay truely; The moo the worse, for ever the fatte of the hole foundacion hangeth on the prestes berdes."[29] Fish also proposed a solution—that the clergy be expropriated and the hospitals and related facilities taken in hand by the king.

In fact, this was the course followed, a course influenced essentially by the Reformation, mercantilist thought, and the rise of absolute monarchy. While the intervention of the civil authorities in matters of welfare and health before the sixteenth century has been noted, the notion that poor relief including medical care was a community, not a church, responsibility was definitely established during the Reformation period. Those who wished to bring some order into the area of welfare and health, whether Vives in Bruges or Zwingli in Zürich, were guided by the same principles and oriented to the same goals: elimination of beggary, organiza-

[28] Paul Bru. *Histoire de Bicêtre (hospice-prison-asile) après des document historiques* .... Paris, 1890, pp. 15-17, 351-353.

[29] Simon Fish. A supplicacyon for the beggers (1529), in *A miscellany of tracts and pamphlets*, A. C. Ward, Ed. London, Oxford University Press, 1927, p. 16.

tion of effective agencies of public assistance, and unification of all facilities and resources (hospitals, domiciliary relief, and the like) in the hands of local or national authorities. With variations, the process and its consequences can be seen in England and on the continent.[30]

This desire to bring some kind of order into the field of assistance went hand in hand with an equally great enthusiasm for the repression of idleness. Condemnation of idleness was, of course, not new; indolence and lassitude had been condemned in ancient and medieval thought. The main difference was that the concerns of the seventeenth century were chiefly political and economic, rather than moral. Most seventeenth century thinkers accepted the idea that governments should use their power to compel all persons capable of engaging in production to do some work. As a result of this view, the economic literature of this period, in England and on the continent, teems with proposals for dealing with idleness. In general, the proposed remedies fall into two groups: the repression of idleness by corrective or punitive legislation, and the creation of institutions which would provide work for the poor and punishment for those who refused to work. From this viewpoint, charity in the medieval sense was to be discouraged, for it led to idleness and beggary. On the other hand, the idle poor, properly employed, would help to make the nation rich and strong.[31]

Economic motivations were reinforced by those arising out of problems of public order. A pamphlet attributed to Dekker, published in 1622 and entitled *Grievous Groans for the Poor,* stated that

> though the number of the poor do daily increase, all things yet worketh for the worst in their behalf; for there hath been no collection for them, no, not these seven years, in many parishes of this land, especially in the country towns; but many of these parishes turneth forth their poor, yea and their lusty labourers that will not work, or for any misdemeanour want work, to beg, filch, and steal for their maintenance, so that the country is pitifully pestered with them.[32]

Fears were prevalent that such demoralized, rootless groups, bereft of resources, could endanger public order. In the middle of the

[30] F. R. Salter, Ed. *Some early tracts on poor relief.* London, Methuen & Co., 1926, pp. 1-31, 97-103.

[31] E. A. J. Johnson. *Predecessors of Adam Smith. The growth of British economic thought.* New York, Prentice-Hall, 1937, pp. 281-297.

[32] George Nicholls. *A history of the English poor law. . . .* London, John Murray, 1854, 2 vols., vol. I, p. 253.

seventeenth century the London streets were beset by beggars. Vagrants hung on coaches and begged vociferously at the doors of churches and private houses. There are also reports that "under colour of begging in the day time" many "loose and vagrant persons" pilfered and stole, and at night "did break into houses and shops to the scandall of the governmente of this City."[33] Economic crises tended to intensify these conditions and at various times and places led to riots and conspiracies,[34] in France for example at Paris in 1621, at Rouen in 1639, and at Lyon in 1652.

To deal with the problems of the poor, the dependent, and the vagrant, a policy of internment and indoor relief was generally adopted, and institutions developed to put it into practice.[35] Thus there were workhouses and houses of correction in England, *Zuchthäuser* in Germany, and *hôpitaux généraux* in France. Many of these institutions were not new creations; they evolved out of pre-existing facilities and in response to problems that occurred at various times. However, it was in the later seventeenth century and in the eighteenth century that they achieved their fullest development.

The course of events in France is illuminating in this respect. From the sixteenth century on, royal action to deal with welfare and health problems occurred along two lines, one concerned with finances, the other, with administrative discipline and efficiency. A series of reform regulations from 1544 on turned over the administration of each hospital to a commission composed of merchants, burghers, and artisans who had to give an annual accounting to the local representatives of the king. In addition to endowments and other sources of income, the king authorized or imposed a communal tax. The first of these measures was issued by Henri II in 1551. Moreover, to insure financial stability, institutions were merged or were put under a general administrative board. As early as the reign of Henri IV plans had been made to establish such institutions for the relief of the poor and needy, but little was achieved. Finally, in 1656 a royal decree was issued founding the *Hôpital Général* of Paris. (It had been preceded by the welfare bureau of Lyon and its affiliated hospital, which dated from 1613-1614.) The purposes of the institution were threefold. In part

33 E. M. Leonard. *The early history of English poor relief*. Cambridge, University Press, 1900, p. 270.

34 Germain Martin. *La grande industrie sous le règne de Louis XIV*. Paris, Arthur Rousseau, 1899, pp. 88-90.

35 Leon Lallemand. *Histoire de la charité*. Paris, Alphonse Picard, 1910, Vol. 4, pt. 1, pp. 214-272.

they were economic: to increase manufactures, provide productive work for the able-bodied, and to end unemployment; in part, social: to punish willful idleness, restore public order, and rid Paris of beggars; and in part, religious and moral: to relieve the needy, the ill and suffering, to deal with immorality and antisocial behavior, and to provide Christian instruction.

The creation of such institutions was not limited to Paris. It was a solution to the problem of poor relief which was tried all through France. Indeed, developments at Paris had been anticipated in the provinces. The *Hôpital Général* at Toulouse dated from 1647, that at Béziers from 1654, and that at Caen from 1655. Most of the provincial general hospitals were established under royal authorization. At Le Mans in 1658 all the hospitals, hostels, and *maisons-Dieu* were united into a general hospital by royal letters patent. This trend was carried further by Colbert, and slowly but steadily general hospitals came into existence throughout France.[36]

IV

The very nature of the functions which these institutions were intended to perform required some kind of involvement with health problems. Though the *Hôtel-Dieu* was supposed to take care of the sick, the *Hôpital Général* took care of old people, people with venereal diseases, epileptics, and the mentally ill. Thus, in the course of time the general hospital combined the characteristics of a penal institution, an asylum, a workshop, and a hospital.

An important purpose was to deal with immorality and antisocial behavior. All individuals who were defined as asocial or socially deviant were segregated by internment. This procedure is analogous to the manner in which the leper was treated in the medieval period. By separating such individuals from society, by exiling them to the *Hôpital Général,* they were consigned to a social and psychological situation of which the dominant character is alienation. A separate socio-psychological lifespace was created for those who removed themselves from or transgressed the moral order considered appropriate to their social position, occupation, or family relationship. Thus, on 20 April 1680 regulations were instituted, providing

[36] Christian Paultre. *De la répression de la mendicité et du vagabondage en France sous l'ancien régime.* Paris, 1906, pp. 155, 209.

that children of artisans and other poor inhabitants of Paris up to the age of twenty-five, who used their parents badly, or who refused to work through laziness, or, in the case of girls who were debauched or in evident danger of being debauched, should be shut up, the boys in the Bicêtre, the girls in the Salpêtrière. This action was to be taken on the complaint of the parents, or, if these were dead, of near relatives, or the parish priest. The wayward children were to be kept as long as the directors deemed wise and were to be released only on a written order signed by four directors.[37]

At the same time arrangements were made to incarcerate prostitutes and women who ran bawdy houses; they were to be kept in a special section of the Salpêtrière.

The consequence of this policy was described by Tenon in his account of the Salpêtrière in 1788.

The Salpêtrière [he wrote] is the largest hospital in Paris and possibly in Europe: this hospital is both a house for women and a prison. It receives pregnant women and girls, wet nurses and their nurselings; male children from the age of seven or eight months to four and five years of age; young girls of all ages; aged married men and women; raving lunatics, imbeciles, epileptics, paralytics, blind persons, cripples, people suffering from ringworm, incurables of all sorts, children afflicted with scrofula, and so on and so forth.

At the center of this hospital is a house of detention for women, comprising four different prisons; *le commun,* for the most dissolute girls; *la correction,* for those who are not considered hopelessly depraved; *la prison,* reserved for persons held by order of the king; and *la grande force,* for women branded by order of the courts.[38]

In short, what had happened by the later seventeenth century was not only or simply an evolution of institutions; it was more than that. It was a change in the social perception of irrationality and madness based on criteria derived from a new view of human nature. Today, the idea of a personal self appears as an indispensable assumption of existence. Actually, like other views of human nature, it is in large measure a cultural idea, a fact within history, the product of a given era. At any given period certain criteria are employed to establish normal human nature, as well as any deviation from it.

V

For the seventeenth and eighteenth centuries, the touchstone was reason and its right use. Reason provided the norm; any divergence from the norm was irrational. Pascal said that he could conceive of a man without hands, feet, or head, but he added, "I

[37] Charles W. Cole. *Colbert and a century of French mercantilism.* New York, Columbia University Press, 1939. 2 vols., vol. II, p. 480.

[38] Tenon. *Mémoires sur les hôpitaux de Paris.* Paris, 1788, p. 85.

cannot conceive of a man without thought; that would be a stone or a brute."[39] Moreover, from the context in which this statement is made, it is clear that Pascal has rational thought in mind. Montaigne had still been able to accept and to discuss reason and unreason as related, interwoven facets of human behavior.[40] By the fourth decade of the seventeenth century, however, a sharp line of separation was being drawn between reason and unreason. Descartes, for example, recognized that reason and irrationality are encountered together, that dreams and errors of various kinds are associated with madness, but he decided to rely upon reason and to avoid the irrational.[41] Thus, unreason and madness were exiled in thought on the basis of a conscious decision.

From this viewpoint, irrationality took on a new aspect; it could be regarded as a matter of choice, as a matter of volition. Unreason, and with it insanity, were related primarily to the quality of volition and not to the integrity of the rational mind. Endowed with reason, man was expected to behave rationally, that is, according to accepted social standards. Rational choice was his to make by virtue of his nature. Eccentric or irrational behavior, actions which diverged from accepted norms, were considered as rooted in error or as derangements of the will and therefore subject to correction.

This view was not limited to France. It is implied in Thomas More's treatment of the lunatic who made a nuisance of himself and is clearly stated in the comments made in 1812 by Mr. Dunstan, the superintendent of St. Luke's Hospital, London. In an interview with William Tuke, Dunstan held that "confinement or restraint may be imposed as a punishment with some advantage, and on the whole, [he considered] fear the most effectual principle by which to reduce the insane to orderly conduct."[42] It was in France, however, that this view received its sharpest expression and its most consequent application.

The comedy of Molière depends on the presentation of the incongruous, the absurd, and the scandalous against an assumption of the normal and the reasonable.[43] According to the *Lettre sur l'imposteur,* "The ridiculous is the external, perceptible form

[39] Pascal. *Oeuvres complètes* (Bibliothèque de la Pléiade). Paris, Gallimard, 1954, p. 1156.

[40] Montaigne, *op. cit.* (note 21), pp. 189-192.

[41] Descartes. *Oeuvres et lettres* (Bibliothèque de la Pléiade). Paris, Gallimard, 1953, pp. 268-273.

[42] Tuke, *op. cit.*, p. 90.

[43] Will G. Moore. The French notion of the comic. *Yale French Studies No. 23* [1962], pp. 47-53.

which the providence of nature has attached to all that is irrational, so as to make us perceive it and compel us to flee it. To understand the ridiculous one must know the rationality whose absence it indicates, and envisage its nature . . . we consider ridiculous that which is entirely unreasonable."[44] This notion of the comic is meaningful because it is closely linked to certain values that were generally accepted by the social and intellectual leaders of the age of Louis XIV.[45]

Highly important in this connection are the concepts of *honnêteté* and *bienséance*. A major characteristic of a person who was considered an *honnête homme* was that he knew himself *(il se connait)*, which meant knowing his position in society and being able to be everywhere at his ease. By recognizing and observing social distances, and thus conforming to one's station in society, one could be accepted as an equal in the company of *honnêtes hommes*. Saint-Simon's praise of Racine on his death in 1699—*rien du poete dans son commerce, et tout de l'honnête homme*—is a clear expression of this view.[46] Racine, a man of bourgeois origin —his father was an administrative official of the salt monopoly—adapted himself to society, knew his place in it, and was therefore able to move in it as an equal among equals.

Involved in the notion *honnêteté* is a sense of tact, a sense of what is appropriate and fitting. This component is also influential in the concept of *bienséance,* which was not only a significant esthetic criterion but also an important social value. Rules of social conduct mingled with axioms of morality and notions of social prudery to provide a standard by which all unseemly depths of emotion were concealed and extravagances of behavior avoided. In these terms, when accepted values and desires are carried to extremes, they appear in an illegitimate and utterly repellent form. A person who acts in this way cuts the lines of communication between himself and other men, thus becoming less than human. Molière's characters—Harpagon the miser, Alceste the misanthrope, and Monsieur Jourdain the parvenu—show what happens when people break loose from rationality, common sense, and moderation. Thus, in his passion for nobility, Monsieur Jour-

44 Cited by Moore, *op. cit.*, p. 49.

45 Erich Auerbach. "La cour et la ville" in: *Vier Untersuchungen zur Geschichte der französichen Bildung.* Bern, 1951, pp. 12-50; English translation in *Scenes from the drama of European literature. Six essays,* New York, Meridian Books, 1959, pp. 133-179, (particularly pp. 159-167).

46 Saint-Simon. *Mémoires* (Bibliothèque de la Pléiade). Paris, Gallimard, 1953, vol. I, p. 623.

dain forgets his limits and in his folly is a caricature of the bourgeois striving at any price to achieve a higher social rank. Madame Jourdain with her sturdy common sense says plainly: "You are mad, my husband, with all your fancies, and this has happened to you since you began to mingle with the nobility."[47]

The emergence and acceptance of these values and the attitudes accompanying them are aspects of the cultural unity which was achieved in France in the 1660's and which provided the basis for the "splendid century" of Louis XIV, the classical age. At the death of Louis XIII in 1643 the political, social, and intellectual atmosphere of France was shot through with discord, conflict, and partisanship. This unstable situation is reflected in the Fronde, the last vain and muddled attempt of the nobility to resist the centralizing tendencies of the monarchy, as well as in the competitive co-existence of such intellectual and social currents as rationalism, preciosity, romantic heroism, and *tendresse*. The turning point came in 1661 when the young, handsome, exceedingly popular young king finally found himself in the saddle. These currents were now mastered and synthesized to form that homogeneous culture which provided the backdrop for and the environment of the *Grand Siècle*. This synthesis resulted from an alliance between Louis XIV and his court, on the one hand, and the urban bourgeoisie, particularly of Paris, on the other. The strengthening of the royal authority went hand in hand with support of those values which the king shared with his subjects, especially those which would tend to preserve and to maintain the political and social organization of the realm.

The theory of absolute monarchy conceived of the relation between a ruler and his subjects like that of a father to his children. The ruler knew what was best for his people and by means of laws and administrative measures ordered what they should or should not do. As authority personified, it was his duty to guard and protect the purity of his subjects' religion, just as a father should act toward his children. Similarly, the family itself had to be sustained, both the large family of the nation, and the small immediate family, and it was the king's responsibility to see that order prevailed and that all were protected.

Among the measures taken were those dealing with persons considered socially disruptive. Within this portmanteau category

47 Moliere. *Oeuvres complètes* (Bibliothèque de la Pléiade). Paris, Gallimard, 1962, vol. II, p. 541.

were included a motley group, the members of which were characterized by the fact that they had overstepped the limits set by family, social position, religious institutions, the political order, property relations, and the like. These were the people who were sent to houses of correction where they might be brought to their senses. In this way the insane in late seventeenth and eighteenth century France were put into institutions with others who exhibited socially unacceptable or irrational behavior. The emphasis in this practice was on the social, not the medical aspect. The purpose of internment in a correctional institution was to preserve paternal authority and family honor, to protect the Catholic religion, and to defend the royal power and preserve public order and security.

This does not mean that mental derangement was overlooked by public officials concerned with these matters. It does mean, however, that even when mental or emotional illness was clearly evident, the individual was committed not primarily to receive medical care but rather to protect society and to prevent the disintegration of its institutions. An example is the comment, made in 1703 about the Sieur de clos Bossard, priest and canon of Vannes, who was recognized as mentally ill, "A cleric like that cannot be hidden carefully enough for the honor of religion and the priesthood."[48] The lesser importance attached to the individual's medical condition is perhaps nowhere better expressed than in the record of Marius, a priest from the Trier diocese, who was admitted to an institution in 1701 because of hallucinations and was finally declared insane in 1706. D'Argenson, lieutenant-general of police, wrote of him in 1711: "I also think and rightly fear that when the interest of Religion no longer compels us to hide him from public view, the derangement of his mind might not impose this obligation."[49]

There were variations among the correctional institutions, so that the Bastille, for instance, harbored more serious offenders than the maison de Saint Lazare. Among the inmates of the latter establishment there was a predominance of the middle clergy, members of the lesser nobility, and of the bourgeoisie. All of them are characterized, however, by that apparently indiscriminate mingling of inmates which our own day finds distasteful, inhuman,

[48] Jacques Vié. *Les aliénés et les correctionnaires à Saint-Lazare au XVII^e et au XVIII^e siècles.* Paris, Presses Universitaires de France, 1930, pp. 92-93.

[49] *Ibid.*, pp. 92-93.

and even immoral. Saint Lazare, for example, contained not only psychotics and mental defectives, but debauched individuals who offended public morals, abortionists, sorcerers, pornographers, and others who cannot be described more specifically but who today would probably be categorized as psychopaths. There were still others detained for religious reasons (priests, Jansenists, and Protestants), for family reasons, or in a few cases, for reasons of state.[50]

The bond that linked this mixed company was transgression of the social and moral order with the consequence that they were subject to punishment, correction, and incarceration. For example, in 1737 the Sénéchal de Brest addressed a petition to the lieutenant of police requesting that his son be interned. He justified the request on the ground that his son, who was heavily in debt and had been dismissed from the army, threatened by his ignominious conduct to disgrace his family and himself. The facts presented by the father were considered as justifying his request, and the son was committed to the Charité de Chateau-Thierry.[51] In 1697 a woman named Loriot was incarcerated in the *Hôpital Général* because she was the mistress of a certain Chartier who had "practically abandoned his wife, his family and his duty to devote himself entirely to this miserable creature who has already cost him the better part of his fortune." Furthermore, as he was a customs official, it was feared that public funds might be misappropriated.[52] Here the basis for internment is the desire to maintain the social structure of the family and the moral obligations entailed by marital relations. Molière had already stated this position explicitly with the assertion by Gorgibus that "marriage is a holy and sacred thing, and it's for decent people to begin with it," and Madame Jourdain's claim that she was defending her rights by endeavoring to prevent her husband from squandering his means.[53] The bourgeois family, its property relations and moral obligations, provided the standard of rationality, and those who

[50] *Ibid.*, pp. 237-239.

[51] René Tardif. *Une Maison d'aliénés et de correctionnaires sous l'ancien régime au XVIII^e siècle. (Histoire de la Charité de Chateau-Thierry)* (Paris Thesis). Paris, Librairie Le François, 1939. pp. 16-17; Paul Sérieux et Lucien Libert. Notice historique sur la Charité de Chateau-Thierry, maison d'aliénés et de correctionnaires (d'après des documents inédits). *Bull. Soc. hist. Soissons,* 11 Feb. 1932, pp. 182-212 (see pp. 191-192).

[52] *Notes de René d'Argenson, Lieutenant Général de Police. Intéressantes pour l'histoire des moeurs et de la police de Paris à la fin du règne de Louis XIV.* Paris, Emile Voitelain et Cie., 1866, pp. 1-3.

[53] Molière, *op. cit.* (note 47), vol. I, p. 224, vol. II, p. 568.

overstepped the limits were judged accordingly. Had not such a person lost his senses?[54]

Blasphemy, religious profanation, and witchcraft fell into the same category because they disturbed the religious and public order. Not infrequently individuals accused of such offenses were also mentally and emotionally disturbed. It is noteworthy that as general hospitals and houses of correction were established, the severity with which these offenses were punished diminished. In 1621 Jean Fontanier, who was in turn Protestant, Catholic, Jew, and finally perhaps a Moslem, was burned alive for heresy.[55] A hundred years later, internment in a house of correction would probably have been his fate. In 1700 a certain De Valmont, "who had scandalized all the spectators at the Comédie, not only by his drunkenness, but also by singing psalms and by accompanying this profanation by the most infamous harangues, was taken to Fort-l'Évêque by order of the King, and . . . his Majesty will find it satisfactory to keep him there for an entire month."[56] Even more striking is the case of a woman named Bertrand.

> Yesterday [wrote d'Argenson] the wife of a lawyer named Bertrand was brought to the Châtelet. This woman, having become possessed of the idea that she was holy, took communion every day for more than six months without any preparation, and even after having eaten. This behavior deserved the most extreme punishment according to the law, but as it was rather a case of madness than evil intent, and besides as one cannot punish these crimes publicly without doing harm to religion, and providing occasion for the evil talk of free thinkers and dissembling protestants, it seemed more discreet to have the husband pay for the support of this woman in a convent such as it may please the King to choose. For I have no doubt that the good example of a regular community, associated with kind attention, will restore her deranged mind in a few months.[57]

The attitude of the later seventeenth and eighteenth centuries are summed up in these remarks.

VI

When Tuke, Pinel, and the other reformers undertook at the end of the eighteenth century to alter and improve the situation of the mentally ill, their actions derived from ideas and attitudes that were different from those prevailing at the beginning of the

54 See for example "L'interdiction," in Balzac: *La comédie humaine* (Bibliothèque de la Pléiade). Paris, Gallimard, 1958, vol. III, pp. 11-81.

55 Frederic Lachèvre. *Mélanges.* Paris, Honoré Champion, 1920, pp. 60-81.

56 D'Argenson, *op. cit.* (note 52), p. 29.

57 *Ibid.*, p. 7; see also pp. 60, 88, 103. For changing attitudes toward witchcraft, suicide, and insanity see Edmond Locard. *Le XVII^e siècle médico-judiciaire.* Lyon, A. Storck & Cie., 1902, pp. 160-179, 260-271, 428-466.

century. Irrationality and madness were now the consequences of historical development and a changing social environment. As civilization developed and spread through the inexorable march of progress, irrationality and insanity were conceived as due to a separation of man from nature, to a deranged sensibility arising from a loss of immediacy in his relations with nature. Madness was the obverse of progress.[58]

From this angle of vision, the seventeenth century view that madness was essentially the loss of rational truth, an error to be rectified by disciplinary measures, could appear only as a gross distortion, a form of tyranny depriving such individuals of their natural liberties. Thus the law of 26 March, 1790, which suppressed the *lettres de cachet* and revoked the *ordres arbitraires,* and the law of 18 August 1792, which dissolved the congregations and orders, led to the disappearance of the correctional institutions. Most of the inmates, except those who were manifestly deranged, were released. The seventeenth century had created institutions to deal with irrational and disturbed behavior in its own image. Their creation was the product of a social order, characterized by certain dominant attitudes. As the society underwent change, these institutions came to be seen in another light and were ultimately changed into something considered more appropriate. Yet that which was new bore tell-tale characteristics of its ancestry. It was within this context that the concept of mental illness began to be defined at the end of the eighteenth century and in the earlier nineteenth century.

[58] George Rosen. Social stress and mental disease from the eighteenth century to the present: some origins of social psychiatry, *Milbank mem. Fund Quart.,* 1959, 37, 5-32.

The Medical History of the Fredericksburg Campaign: Course and Significance

GORDON W. JONES*

THE Battle of Fredericksburg was fought on 13 December 1862. It is generally rated one of the worst managed, from the Union point of view, of America's many bungled battles. General Ambrose Burnside has never been forgiven his great losses despite the fact that General Grant's were of much the same unnecessary magnitude at Cold Harbor later in the Civil War. Interesting militarily as the battle may or may not have been, it is of importance in the history of medicine as a turning point in the care of the wounded. Beginning with Fredericksburg, there was less confusion than before in the handling of the injured, and, perhaps, more mercy.

When the Civil War broke out, the military was served by a body of physicians whose horizons had been restricted by many years of dull routine in a tiny professional army. Few of the higher ranking doctors were equal to the demands of the vast Civil War mobilization. Their imaginations could not grasp the military medical implications. It took the North many months to find able physicians. Those in charge early in the war fumbled. Hygiene in the camps was terrible. The suffering of wounded men, left neglected on the fields, was a national disgrace. The fault lay largely in the fact that the medical service was, in accordance with tradition, organized by regiments instead of by larger units.

This poor organization had prevailed in 1861 and in the earlier fighting of 1862. It will be recalled that 1862 had already seen the fierce Seven Days' Battles east of Richmond in June, the Second Battle of Manassas in August, and the Battle of Antietam in September. It was after the Richmond battles that there was public demand for reform in the North because of the treatment of the wounded in the Union army. The handling of the Confederate wounded had been no better despite the fact that Richmond and its hospitals were close at hand. Dr. Lafayette Guild, Medical Director of Lee's Army of Northern Virginia, had reported his grave concern.[1]

* Fredericksburg, Virginia.

1 *War of the Rebellion, official records.* Washington, D. C., various dates (hereafter cited as *O.R.*) Ser. I, vol. 11, pt. 3, p. 633.

This scandal of 1862 strengthened the hand of the U.S. Sanitary Commission (forerunner of the Red Cross) which had been created in 1861 over the opposition of the old-line medical bureaucracy. This organization independently inspected troop facilities, criticized sanitary arrangements, collected and distributed supplementary supplies, and succored the troops. Without this great citizens' group the medical débacle would have been appalling indeed. In addition to increasing the popular support of the Sanitary Commission, the experiences east of Richmond forced an internal reform in the medical department of McClellan's Army of the Potomac.

In June of 1862 General McClellan performed what was perhaps his greatest single service to his country. On advice from that favorite of the Sanitary Commission, the new Surgeon General William A. Hammond, he appointed Jonathan Letterman Medical Director of the Army of the Potomac. Letterman was a Pennsylvanian and a graduate of Jefferson Medical College. He was one of those who for twelve years had been in the medical department of the regular army, their talents hidden in various obscure posts. But army routine had not blunted his abilities. In his new position Letterman reorganized the chaotic medical service effectively.

Before he came to power, each regiment had had its own medical service with its own regimental hospital. Its wounded were cared for by its surgeons, whose competence had varied greatly from regiment to regiment. Line officers had used the regimental medical transport to carry their personal effects. Also, in emergencies, the medical transport had been freely used for purposes other than medical. In time of battle the regimental musicians, largely untrained, had acted as litter bearers; often unharmed soldiers had carried their slightly or severely wounded comrades to the rear, using this opportunity as an excuse to get to safety. Perhaps all this had been well enough in battles involving a few regiments, as in past wars. But when several hundred regiments were thrown into battle, the whole system had broken down into an incredible shambles.

Such was the situation that Letterman reformed. In general, he reorganized the medical department by division rather than by regiment. However, his first step was to set up an ambulance service by an even larger army unit, the corps. This service was directed by a captain who was responsible to the medical director of

the corps, not to a line officer. This was an innovation. Previously, medical officers had not had line officers under their command. Under the captain there were first lieutenants in charge of ambulances serving divisions and second lieutenants in charge of those serving brigades. All these officers were mounted for the sake of mobility. Enlisted men trained as litter bearers rode the ambulances and went into battle with the troops. Two medical officers were assigned to the corps ambulance train on the march. The ambulances of each division were kept together. Measures were employed to prevent the use of ambulances by line officers not attached to the medical department. In practice the quartermaster corps retained more control over these ambulances than Letterman liked.

Next Letterman planned a reform in supply so that there might be one wagon per regiment for hospital purposes and one wagon per brigade for bulk supplies. These wagons were placed under medical, not quartermaster, command.

Finally he reorganized the field hospital system. He ordered that, before an engagement, there be a field hospital for each division, conveniently situated in a sheltered spot, with a surgeon in charge, an assistant surgeon to provide food and shelter and one other to keep records. He arranged that there be three medical officers to do the operating and three officers to assist each of these operators. Most of these doctors were regimental surgeons who were ordered to leave their regiments at time of battle and report to the division hospital. Letterman insisted on appointing as operators only the most capable, no matter what their rank or seniority. This policy created irritation among men who felt they deserved the glory, not the drudgery, of field hospital work. One assistant surgeon in each regiment was ordered to go forward with trained litter bearers (no longer necessarily the musicians) and establish a first-aid station near the front and send wounded back to the field hospital of the division to which his regiment belonged.[2]

The above is a brief résumé of extensive and detailed orders. On paper it all looks simple enough. But at the time it meant a big change, and such Washington bureaucrats as General Halleck were contemptuous. Secretary of War Stanton joined the opposition, largely because of his dislike of Letterman's superior, the Surgeon General. It took months to put the reforms into effect.

2 Letterman, Jonathan. *Medical recollections of the army of the Potomac.* New York, 1866, pp. 24-63.

They were delayed by the fact that Letterman was not in charge of affairs during Pope's disastrous Campaign of Second Manassas in August 1862. Confusion, and the fact that most of the ambulances had been left behind at Fortress Monroe when much of McClellan's army was sent to General Pope, made care of the wounded in that fighting as disgraceful as ever. When Pope was dismissed and McClellan reinstated, Letterman too came back as medical director of the army. He found an almost total loss of medical supplies. The ambulances were still missing, and only a few arrived before the Battle of Antietam. All arrangements had to be made in haste during the September advance on the enemy. Field hospitals were set up in barns and manned by surgeons assigned to them without any particular system. After the battle, wounded were scattered, by wagon and railroad, literally all across Maryland. With this confusion as a stimulant, Letterman quickly completed his plans for a field hospital system and let them be known in a circular dated 30 October 1862.[3] His system came into its first full operation at Fredericksburg, six weeks later, making this battle of great significance to medicine.

The military aspects of the Fredericksburg Campaign may be summarized briefly. It was begun late in November 1862, shortly after General Burnside had been made commander of the Federal Army of the Potomac to succeed the slow-moving General McClellan. The first move was a quick change of base from north-central Virginia to the area about Falmouth, a village lying on the north side of the Rappahannock River opposite Fredericksburg. Burnside's plan was then to move quickly across the river, seize the heights west of Fredericksburg, and then move south on Richmond. But these plans were put into operation too slowly and he thereby gave his opponent, General Lee, time to occupy the heights.

On 11 December 1862 Burnside managed to throw three sets of pontoon bridges across the river. The upriver bridge, located between the two present highway bridges leading into Fredericksburg, was laid in the face of great Confederate resistance. In laying the second one, below the railroad bridge, and the third, a mile farther downstream, his men met only token resistance. The town was finally seized and the defenders pushed back to their main lines on the heights. December 12th was spent in a ponderous

[3] *O.R.*, ser. I, vol. 19, pt. 1, pp. 106-117.

movement of the Union army over the pontoons and in their leisurely deployment.

On 13 December the battle began (Fig. 1). If it had been managed correctly, the left wing, deployed in the region of Smithfield Plantation (the present Fredericksburg Country Club), might have been able to crush Lee's right wing and fold it back. But it was poorly directed and was repulsed. The Federal right wing, attacking from Fredericksburg proper, was sent against the impregnable line on the hills where stood thousands of well-protected and well-managed Confederates. The result was a bloody defeat.

December 14th saw no military activity of note. Lee made no counterattack. Burnside's officers persuaded their commander that the whole thing was hopeless. By late on December 15th the army had been drawn back across the river to Falmouth (Fig. 2). No advantage had been derived from the loss of 1,284 killed and 9,600 wounded. The Confederates had lost 458 killed and 3,743 wounded.[4]

It would appear that ineptness as well as lack of speed in executing his plans lost the battle for Burnside. However, the weeks wasted gave Letterman opportunity to reorganize and make plans for a medical campaign almost unique in the Civil War for their effectiveness.

He had many problems. Not the least of these was the quality and discipline of his medical officers. There were slightly more than 550 of them in his service. Some were worthy, some not. In our day when medical training is remarkably uniform it is hard to realize the variation in competence which existed a century ago. Though there were many able commissioned physicians, the official records and memoirs are full of the complaints of the competent against the dullards and know-nothings who somehow got commissions. In the National Archives are the service records of all. It is not unusual to find a curt note on the final card of a doctor's record, "Dismissed from service." Such men were not usually the graduates of the city medical schools of the day nor of the better "country" ones (Dartmouth, Yale, University of Virginia, etc.). Many physicians were mere ex-apprentices. In addition, there were the botanics, the eclectics, and the home-

[4] A very readable recent book on the battle is E. J. Stackpole's *The Fredericksburg campaign*. (Harrisburg, Pennsylvania, Military Service Publishing Company, 1957, 297 pp.). Obviously, only the barest essentials are noted in this article. Other secondary sources used in the preparation of this paper are W. Q. Maxwell's *Lincoln's fifth wheel*. (New York, Longmans, Green and Co., 1956, xii, 372 pp.) and G. W. Adams's *Doctors in blue* (New York, Henry Schuman, 1952, xii, 253 pp.).

opaths, all anathema to the regulars. However, relatively few actual "quacks" got into the Union armies and none received the highly desirable U.S. commissions as Surgeons of Volunteers, the physicians assigned to the Surgeon General's office for duty anywhere he saw fit. Nevertheless, at times the governors did appoint sectarians and incompetents to state regiments before they were mustered into the Federal service. In contrast, the Confederate armies did use more of the botanics at least.[5]

A few of Letterman's subordinates at Fredericksburg may be mentioned as examples of the more competent officer. J. H. Brinton, Surgeon of Volunteers, Jefferson graduate, was there as an observer, surgical preceptor, and collector of material for the Army Medical Museum of which he was then in charge. His prominence and reputation during the war were great. We find him frequently quoted as an authority. He has left an interesting account of conditions in Fredericksburg. P. A. McConnell, Harvard graduate, medical director of the Ninth Army Corps (of the Federal right wing) held a state commission. Because of his effective service at Fredericksburg, Letterman strongly endorsed his later application for a Federal commission. Assistant Surgeon R. O. Craig, Albany graduate, also holder of a state commission, was an example of Letterman's interest in ability rather than rank. He was appointed medical director of the Fifth Corps although many outranked him. Charles O'Leary, medical director of the Sixth Corps and formerly a professor at Ohio Medical College, was, however, a Surgeon of Volunteers.[6] There were three other corps medical directors, each in charge of a large number of doctors. For example, O'Leary commanded 100, McConnell, 74, and Craig, 71. There seemed to be no real relationship between the number of medical officers and the size of the corps concerned.[7]

Military physicians had, of course, many other duties besides treating the wounded. They were busier, by far, treating men sick with the illnesses of armies. The best of them interested themselves in preventive medicine. In this they had to have the co-operation of their colonels. Though the health of the army was his problem, Letterman had little effective control over regimental

[5] Much interesting material on the sects is to be found in Alexander Wilder's *History of medicine* (Augusta, Maine, 1901), especially pp. 427 ff., and about the utilization of botanics and eclectics in the Civil War armies, p. 666.

[6] In this paper practically all the information about individual doctors that is not relatively common knowledge was obtained from their service records in the National Archives.

[7] Letterman, *op. cit.*, pp. 76-78.

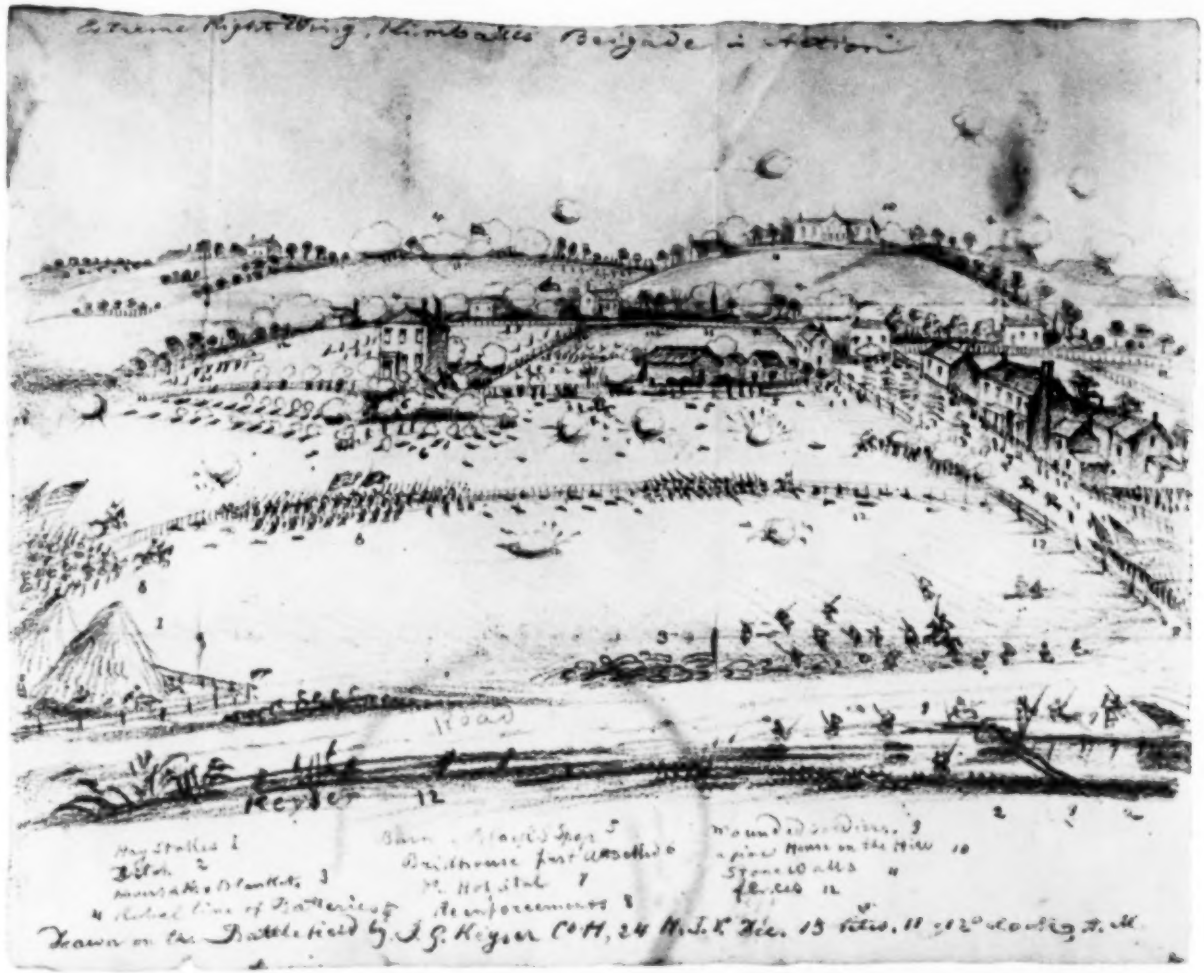

Extreme Right Wing, Kimball's Brigade in Action
Road
Reyer 12
Hay Stacks 1
Ditch 2
Mounted Officers 3
Rebel Line of Battle 4
Barn & Hay Stacks 5
Brickhouse first occupied
Rebel Hospital 7
Reinforcements 8
Mounted Officers 9
a few Houses on the Hill 10
Stone Walls 11
Fences 12
Drawn on the Battlefield by J. E. Heyer Co H, 24 Mich. Vols. 13 Corps. 11 & 12 Corps. A. of P.

Fig. 1. The charge of Kimball's brigade the morning of 13 December 1863. (From original pencil sketch in the possession of the author.)

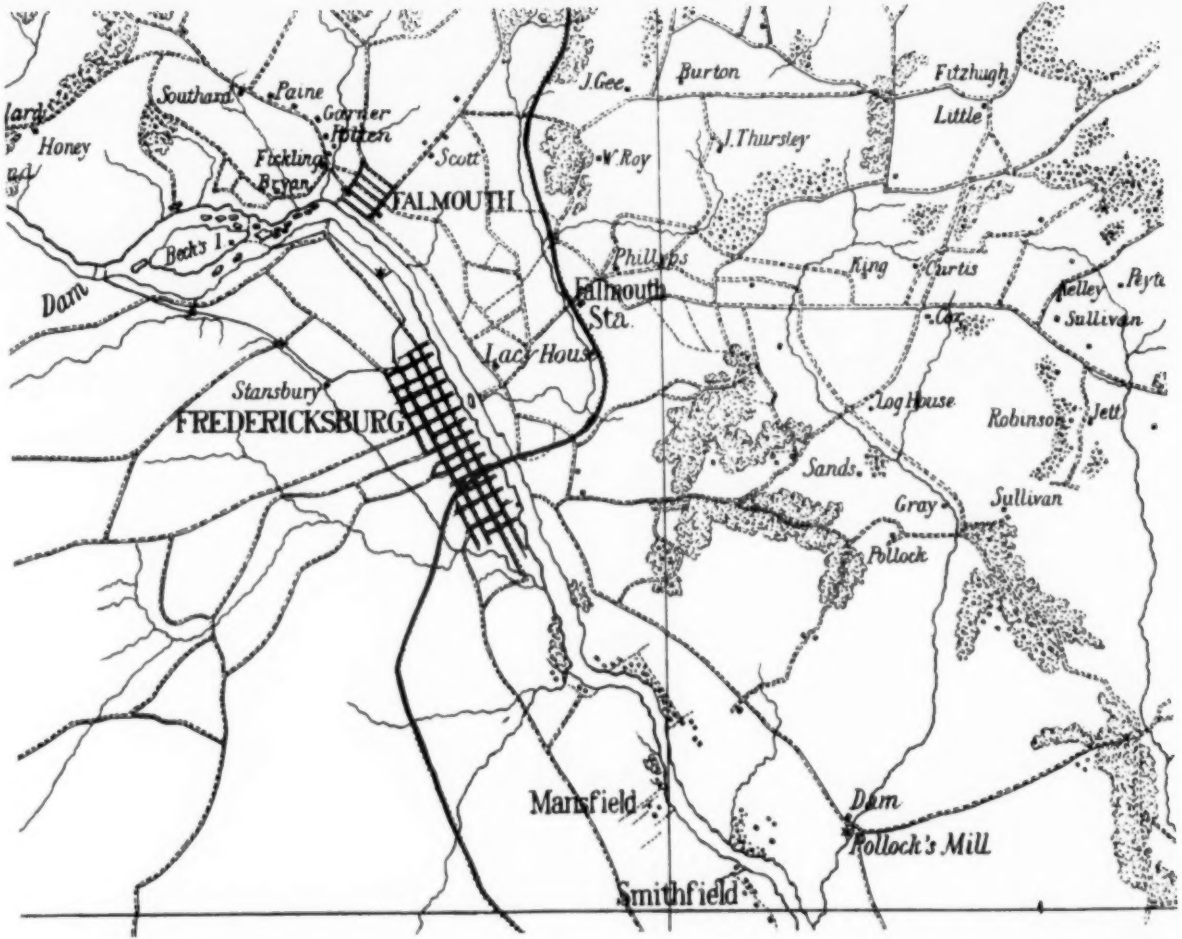


Fig. 2. Map of the Fredericksburg area. (A section of a contemporary map in the possession of the author.)

Fig. 3. Windbreak comfort at Falmouth, Virginia. (From original ink-on-linen drawing in the possession of the author.)

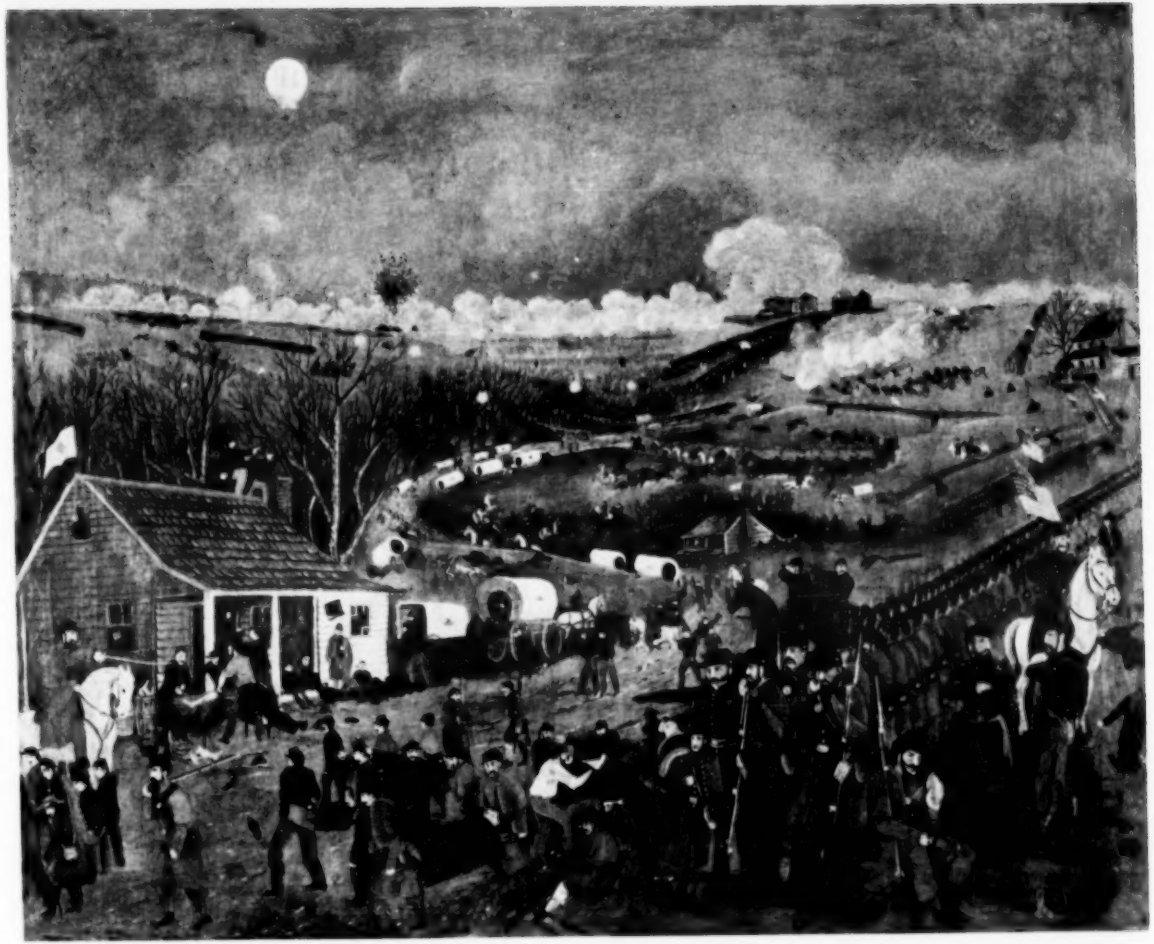


Fig. 4. Field hospital activities going on in full view of nervous reserves at the Battle of Fredericksburg. (From a private collection, New York.)

medical practice, but the hygiene of the Union troops was probably about average for the century. Some regiments were so well policed, and thus healthy, as to win the praise of foreign observers. Others were filthy. Typhoid and dysentery were common. Some regiments had an enormous percentage of sick, either in quarters or in the little regimental hospitals (division hospitals were, in Letterman's scheme, for battle emergency only). Assistant Surgeon Steinach of the 103rd New York reported that usually he had six or eight men in his hospital and from six to eighteen sick in quarters, but only three or four cases of typhoid. Of his sick, one man died of dysentery and one man shot himself shortly before the battle.[8] In contrast, Surgeon Church of the 141st Pennsylvania sent the amazing total of 169 men to a general hospital before the battle.[9] This was in obedience to the quite sensible order that all really sick men be sent off before the fight. However, many surgeons, perhaps on orders from their colonels, did not obey. More than one typhoid fever patient had his feet frost-bitten as he lay negelcted while the army was away fighting.

"Quarters" for the 120,000 Union soldiers meant tents. These were comfortable enough. Some units further protected themselves by erecting barricades of cedar boughs (see Fig. 3). In theory, the men were well fed. In fact, they were often fortunate if they had enough hard army bread (hard tack). Moving supplies by rail through an area which had to be guarded against guerrillas and then by wagon over miles of dirt roads was a great problem. Munitions came first, comfort second.

This problem of supply was one reason for Burnside's move to Falmouth. He gained easier access to his main base of supply; bulk transport by water was cheap and easy. Aquia Landing on the Potomac, only a few miles by rail from Falmouth and convenient to Washington, soon became a vast depot of munitions. Here also the medical director created a reserve of hospital supplies and medicines. However, Letterman evidently tried to handle too many details personally. He had no commissary of supply.[10] There may have been some order in his depot, but there were

[8] U.S. Surgeon-General's Office. *The medical and surgical history of the War of the Rebellion.* Washington, D. C. 1870-1888 (hereafter cited as *M.S.H.*) Medical volume, pt. 1, Appendix, p. 134 (hereafter cited as *M.S.H.* Appendix).

[9] Fatout, Paul, Ed. *Letters of a civil war surgeon.* West Lafayette, Indiana, 1961, p. 40. Some of these men were sent to Washington, some to what were called "corps general hospitals" at Brooke and Aquia Landing, Virginia.

[10] According to Perley who is quoted below. Apparently as a kind of rebuttal Letterman reported his satisfaction with Assistant Surgeon McMillin and his efforts as medical purveyor at Fredericksburg. *M.S.H.* Appendix, p. 103.

also confusion and error. For instance, 500 extra hospital tents were stored there, but I find no mention of cots. There were many coal stoves to heat the tents but they were too large and too hard to handle.[11] They also overheated, and surgeons later complained more of the heat than of the bitter cold on the Fredericksburg plain. There was a serious shortage of warm woolen clothing for the wounded after the battle. This lack was remedied only by the Sanitary Commission.[12] These and other shortages and mistakes were partly due to a very human underestimate of the casualty toll. Furthermore, Letterman had evidently planned for transshipment of wounded to Washington, if his own "general" hospitals at Brooke and Aquia did not suffice.

However, Letterman's fame does not rest on his abilities as a commissary officer but rather on his reorganization of the medical personnel and his over-all direction of his medical chain of command. His officers made much more elaborate preparations for the Battle of Fredericksburg than did the Confederates.

As soon as the Union army had managed, on 12 December, to seize the deserted and damaged city and drive away the snipers, it was deployed in a remarkably leisurely manner. It became a "grand military spectacle" to the Confederates who watched from the hilltops about the town. But the medical officers took advantage of this delay and busily selected sites for their division field hospitals. Since the 254 Federal Regiments were divided among 18 divisions, there were necessarily 18 such field hospitals. It may be of interest to discuss a few of them briefly.

In the area which was occupied by the Federal left wing, down river from Fredericksburg, there were two fine mansions. One of these, Smithfield, became the field hospital of the First Division of the First Corps. It was very comfortable, even hot, according to J. T. Heard, the medical officer in charge. In a deep ravine just riverward from this mansion the Third Division established a tent hospital which was quite well protected from enemy fire despite the fact that the Confederate cannon were hardly more than 3,600 yards away. These two division hospitals were so close to the front that stretcher bearers were able to bring in the wounded directly from the firing line.[13]

[11] *O.R.*, ser. I, vol. 21, pp. 957-959.

[12] Stillé, C. J. *History of the United States sanitary commission.* Philadelphia, 1866, pp. 368ff.

[13] *M.S.H.* Appendix, p. 131.

It suited General Franklin to take the other big house, Mansfield, later destroyed, as headquarters and thus keep it out of medical hands. As a result, the hospital for his other division had to be established on the opposite side of the river almost directly north of Smithfield, at the Pollock house. This necessitated more handling of the wounded of that division: men on stretchers were taken to an ambulance station behind Mansfield, transferred, and carried by ambulance by a roundabout route over the pontoon bridge to the hospital.

In Fredericksburg proper there were many deserted buildings suitable for hospital use, despite the fighting and shelling prior to the occupation. In fact, Dr. Brinton was surprised at how little really serious damage had been done to the town beyond a few shell holes in walls and some rooms full of fallen plaster. As soon as Fredericksburg was secure, Letterman hurried over and inspected these buildings. He was especially pleased by the convenient cluster made by the Courthouse and the nearby churches. Furniture was moved, and straw was probably placed over the floors to receive the wounded. Operating rooms were quickly selected and furnished. One of these was the still-used courtroom. It saw great activity for more than fifty hours, with twelve doctors working at three tables. It was then abandoned, and just in time. Minutes after the last patients and the last Yankee doctors, among them Brinton, had left, a Confederate shell burst in the courtroom. The safety of this hospital group had been jeopardized by the use of the St. George's steeple as a signal and observation post. This activity had drawn enemy fire. Such disregard of the army command for the safety of the hospital group is striking.[14]

Other buildings in the center of the town used as hospitals were hit by shells, but no casualties resulted. Still others were in more protected spots. The desire for shelter made it occasionally necessary to permit hospital activities to be carried on in full view of nervous reserves (see Fig. 4). Field hospitals for the right wing were also set up in tents or buildings on the Falmouth side of the river. One was behind Burnside's headquarters at the Phillips house. Another was at famous Chatham, as we shall see. These Falmouth hospitals became overcrowded when Fredericksburg was evacuated. Perhaps Letterman had not calculated on defeat.

[14] Brinton, J. H. *Personal memoirs*. New York, 1914, pp. 213ff. I have made no attempt to list all the hospital sites in Fredericksburg. Probably every habitable house was used for this purpose or for billeting troops. Documentary proof is lacking for many of the traditional hospital sites.

"Vast" medical stores were brought to all these hospitals. Medical officers later reported pleasure, even amazement, at the abundance of these supplies—an abundance they had not seen before during the war.

The 88,000 Confederates were probably less well off physically than the Federals. Sanitation was no better. So far as diet was concerned, only flour, unsmoked bacon, and occasionally beef were issued. No vegetables were available. Lafayette Guild, Letterman's Confederate counterpart, worried over the tendency to "scorbutus" and begged for potatoes. He reported the usual dysentery, upper respiratory infections, and some smallpox during the winter.[15] Letterman, with too much to do, might well have envied Guild, for the comparative ease of his problem.

Guild's arrangements for the battle were simple. A surgeon and litter-bearer were ordered to the front with each regiment. After receiving first aid the wounded were sent back to "field infirmaries" which were little more than collecting stations. Very few "capital" operations were done on the field. At these infirmaries they were loaded on ambulances, of which the Confederates had remarkably few, and were carried along the good military road behind the lines to a rail depot. There the volunteer Richmond Ambulance Corps took over, loaded the wounded on cars, and took them by the easy rail haul through friendly territory to Richmond and its general hospitals.[16] A field hospital set-up like Letterman's was not practical. All barns and buildings south of Fredericksburg were filled with civilian refugees and Guild had very few tents for hospital purposes. After the battle several Confederate generals praised their medical officers for the speed with which they got the wounded out of the way. Richmond took the whole burden at once, Washington only after weeks. Letterman had aimed to help the seriously wounded immediately and not move them any more than necessary to get them out of danger.

As the Union soldiers advanced into battle on December 13th, their medical officers also went along, established themselves in the rear of their respective brigades or regiments in the most sheltered but accessible positions, and sent the stretcher men ahead for the wounded.[17] The wounded at these stations, after emergency

15 *O.R.*, ser. I, vol. 21, pp. 1084-1085.

16 *Ibid.*, p. 557.

17 Be it noted that apparently the first true field first-aid stations were the invention of Baron Larrey during the Napoleonic wars.

attention, were sent back to the field hospital of the division for surgery.

The Battle of Fredericksburg was remarkable for the high proportion of injuries to the extremities. For example, in the Second Corps there were 900 wounds of the upper extremity, 825 of the lower, 250 of the head, but only 130 of the chest and abdomen.[18] One surgeon reported a larger number of excisions of elbow and shoulder joints than in any other engagement of the Army of the Potomac. There were many amputations. In the hospitals of the First Corps alone there were over a hundred during the first 48 hours.[19] Operations aside from orthopedic procedures and arterial ligations, were few. Abdominal wounds were untreated except for the removal of easily found foreign bodies. Since even a minor wound in the Civil War often meant death, it was a noteworthy advance that men could now receive definite medical attention only a few hundred yards behind the front.

The fighting, wounding, dying, and mending went on all day on December 13th. Wounded men lying on the field before the murderous Confederate guns suffered agonies of thirst and pain. No one could live who went to succor those who had charged the farthest. Yankee stretcher bearers had to await nightfall and stumble without lanterns over the field looking for the wounded; a flicker of light brought a Confederate bullet. The night was cold and bitter for the suffering men. Oozing wounds became frosted and frozen. Many recieved no relief before they died except from such a gallant foe as Sergeant Kirkland of South Carolina, who, after wringing reluctant consent from his commander, gave water to the delirious, thirsty, dying men in his front.[20] There were other instances of kindness. One middle-aged Confederate was never forgotten by a group of wounded who had to lie in the cold for fifty hours before they were rescued under a flag of truce. This man had moved about with friendly words, a few biscuits, and doses of whiskey and water.[21]

All night the Federal surgeons continued their work as the wounded were brought in. Blankets were nailed over windows so as not to attract Confederate marksmen, and the operations went

[18] Letterman, *op. cit.*, p. 79. See also the *Manuscript report of the medical director of the Army of the Potomac for 1862* in the National Archives.

[19] *M.S.H.* Appendix, p. 130.

[20] Kershaw, General J. B. "Richard Kirkland, the humane hero of Fredericksburg." *Southern Historical Society Papers,* vol. VIII, Richmond, 1880, pp. 186-188.

[21] Whitman, Walt. *The wound dresser.* R. M. Bucke, Ed. Boston, 1898, p. 27.

on by candle and lamplight.[22] By evening of the next day, December 14th, few major operations remained to be done, so long and fast had the surgeons worked on the nine thousand wounded. During the day, the Confederates on Marye's Heights had watched with "awed fascination" as the long lines of stretcher bearers wound across the field toward the division field hospitals and as the multitude of ambulances, their yellow flags flying, transferred patients over the pontoons. On that day five thousand wounded of the First and Sixth Corps alone were moved to hospital tents and requisitioned buildings on the Falmouth side of the river. The rest of the wounded were transported the following day. The medical officers then checked every hospital for forgotten men. Under a flag of truce more were sought on the field. There were many burials by details during this search although an English observer maintained that the Federals left most of their dead for the Confederates to bury. Certainly an afternoon is too short a time to bury 1,339 dead. The entire Federal army stole away that night across their pontoons, not to return until the next year.[23]

The multitude of wounded piled up in the division hospitals about Falmouth and in the regimental quarters. Care from this time onward was possibly better than it had been after other battles, but to us it would have seemed primitive. Of this period we have the eye-witness reports of the poet Walt Whitman. He visited the Falmouth camps and hospitals as a freelance reporter and philanthropist; he let the world know what he saw and did his best to help the sufferers. He was far from impressed by the comfort and care of the men even when they were housed in such fine buildings as Chatham, the Lacy house. That splendid brick mansion was filled to overflowing with 1,200 unwashed men lying on blankets in their dirty, bloody uniforms. Many were dying. At the foot of a tree on the lawn there was a heap of arms, legs, hands, all callously unburied. Nearby were several corpses covered with blankets. The men in the tent hospitals were no better

22 This necessity to operate in the light of an open flame was a major reason for the almost universal use as an anesthetic of non-flammable chloroform rather than ether during the Civil War. The quick induction with chloroform was another advantage when there was a great backlog of surgery to be done. The mortality from its use was surprisingly low. It was positively stated that no deaths attributable to chloroform occurred at Fredericksburg, and this happy war experience prolonged its use. The consensus of the profession had been running heavily in favor of ether just before the war. See, for instance, "Ether and chloroform compared as anesthetics" translated and reprinted from *Gaz. méd.* in *Boston med. surg. J.*, 1859, *61*, 129-135, and the editorial in the same issue, pp. 145-147.

23 *Battle-fields of the South, from Bull Run to Fredericksburg.* By an English Combatant. New York, 1864, pp. 511-516. Also *M.S.H.* Appendix, p. 103.

situated. They too were crowded, and there were no cots. The men lay on blankets spread over pine boughs and leaves or even on the bare cold ground.[24]

This congestion was relieved as rapidly as possible by sending the wounded on to the Washington hospitals. Those injured least were sent away first. Such was the Union medical custom during the Civil War: leave to the last those who are least able to endure transhipment. Letterman, at Falmouth, did not want to move the serious cases at all. He dreaded exposing them to a long cold trip in the dead of winter. He pleaded with General Burnside, asserting that the men were surely as safe in Falmouth as in Washington. Burnside was adamant; the wounded had to be "cleaned out." A feeling of mercy toward the wounded was not noticeable among Civil War generals. This was one of the liabilities of the Medical Bureau. Letterman did manage to keep the severely wounded cases about two weeks, but, late in December, they too were moved. The patients were taken by ambulance to the railroad cars and then transferred to the bare boards of river steamers after a rough ride. Finally ambulances in Washington distributed them to the various hospitals. There were few, if any, officially reported fatalities on the way, but suffering was intense. Healthy medical officers reported that the weather was fine and warm for the season, but the helpless, roughly handled wounded did not agree. Many of the cars were mere platforms "such as hogs are transported on." The cold boat trip was a nightmare. All this Letterman had anticipated in his protests to Burnside. He did his best: he supplied the men with surgeons and sent along large quantities of the favorite stimulants of the day—whiskey and brandy.[25]

Walt Whitman claimed that he saw men die on the way. He saw feeble men neglected and even callously pushed about. And when the men joined the other fifty thousand wounded and sick in Washington, this most compassionate of men continued to snoop, befriend, and finally to labor long hours for the wounded. He was outraged when crude wardmasters roughly ordered men nearly dead from typhoid or wounds to care for themselves. He was disgusted by the military ritual, etiquette, and red tape which surely should have been abandoned among the sick.

However, most of the official reports of affairs at Fredericksburg, written by army surgeons, contradict Whitman. There is exultation over the treatment of the wounded. Brinton praised.

[24] Whitman, *op. cit.*, pp. 22-24.
[25] *Ibid.*, p. 5, p. 24. Also *M.S.H.* Appendix, p. 104.

Even Stillé of the Sanitary Commission was not very critical. Only by the strictest attention to the wording of some of these reports do we infer that all was not well. It is Whitman's evidence that first makes us suspicious. Whitman, be it emphasized, did not see the medical department in action during the battle.

Moreover, among all the professional praise, we find one harsh dissent, that contained in the report of Colonel Thomas F. Perley, the medical inspector general. It seems a little strange that this man should have attained such a high rank because his service records show that he had something of a reputation as a trouble maker. Early in the war he had been under arrest for some undisclosed reason. Perhaps it had to do with his anonymous letter blasting conditions in the Mound City, Ohio military hospital. He had denied this letter, but a court of inquiry, on which the ubiquitous Dr. Brinton had sat, had proved his authorship. On at least one other occasion he had made bitter comments about medical conditions in army hospitals. After the Battle of Fredericksburg, Letterman found him an unendurable gad fly and complained that Perley had high-handedly discharged men from service without proper formalities. Finally Surgeon General Hammond himself penciled a long letter to the Secretary of War recommending that the President dismiss Perley. Perley did resign as medical inspector on 10 August 1863. He was immediately reinstated as Surgeon of Volunteers. He apparently raised no further storms during the war.[26]

This was the one physician who criticized Letterman. Some days after the battle, while the wounded were still being transferred to Washington, Perley made a tour of inspection of the camps and hospitals in the Falmouth-Aquia region. He did not like what he saw. In a report which was little short of venomous he informed Surgeon General Hammond that not much had been right medically at Fredericksburg. He complained of the lack of such medical supplies as hospital clothing (a lack confirmed by Stillé). He was critical of the big stoves. "The right kind of stoves for the hospital tents should have been on hand when the battle started," he wrote. We can certainly agree that there had been enough time. Burnside had dallied at Falmouth for nearly a month before the battle, using as an excuse the absence of his promised pontoons. For this he blamed headquarters at

26 See Perley's service records in the National Archives.

Washington. Perhaps Letterman's shortages were the fault of Washington, too.

Perley had yet harsher things to say. He claimed that he had never seen such misery, that the wounded were without food, except hard tack and what food private individuals brought them, for days after the battle. On 15 December many men were lying without shelter in the heavy rain. For a week after the battle there was no heat in the tent hospitals despite the very cold weather. It seems he even disagreed with other medical men about the weather. Further, Perley raged at the neglect on the transports between Aquia and Washington. He asserted that many men froze during the 17-hour trip. Without mentioning a name, he concluded his report by saying: "The principal medical officer of the Army of the Potomac is incompetent."[27] This, despite the fact that he, like Whitman, did not see what went on during the actual battle.

What is the truth? Letterman was proud of his reorganization and of the effective way it worked at Fredericksburg. There was general agreement; no one found fault with what happened during the battle and the withdrawal. But was there a breakdown afterwards? The answer, according to the old memoirs, not only of Whitman but of many nurses and doctors, is a qualified yes. And, however biased, Perley was certainly a witness. If we study Letterman's report, we perhaps detect a somewhat defensive attitude about this period in his career. Evidently, however, even here conditions, though not good, were better than before. Such a conclusion is justified by a study of the many favorable reports written by medical officers. These physicians were veterans; they had seen other battles. The aftermath of Fredericksburg was Whitman's first experience on the field. It was Perley's first, and only, tour as an inspector. Letterman's fame has remained secure. His contemporaries realized that he could hardly be blamed for the multitude of commissions or omissions of his subordinates while they cared for the sudden influx of thousands of badly hurt men. It was to these subordinates that Perley's criticism probably should have been directed. Bitterness, jealousy, or spite may have caused him to heap all the blame for the suffering after Fredericksburg on one overworked medical official. He was unnecessarily harsh; his comments thus had little influence at the time. From our twentieth century point of view his general observations,

[27] *O.R.*, ser. I, vol. 21, pp. 957-959.

shorn of their harsh overtones, were probably correct. It was a terrible experience to be ill or wounded and friendless during the Civil War. Surely, adequate care of and mercy toward the wounded did not need to end with the battle. The ideas of Perley (both here and at Mound City) and of Whitman with their emphasis on mercy seem to have been in advance of their times. To be fair, however, we must also recall Letterman's efforts to change the often callous attitude of higher officers toward the wounded.[28]

Everything considered, Letterman's Fredericksburg accomplishment may be termed a nineteenth century military-medical classic. Supplies for the battle were adequate. The ambulance service worked well. Thousands of wounded received definitive treatment with dispatch. Evacuation over the potential bottle necks at the pontoon bridges was uneventful. A similar success was not soon repeated. It is possible that part of Letterman's good fortune at Fredericksburg was due to the fact, surprising to many, that Lee did not counterattack the morning of 14 December. At Chancellorsville in May of 1863 Lee's unexpected advance placed Letterman's field hospitals within cannon range. Confusion, even panic, resulted. Satisfactory results at Gettysburg were prevented by a lack of supplies, through no fault of his own, though there were enough ambulances and enough hospitals in a friendly countryside. At Wilderness and Spotsylvania in May of 1864 (Letterman had resigned before those battles), there were too few ambulances and much confusion due to Grant's abrupt change of base while the casualties were mounting rapidly. A truly efficient medical campaign, in the East at least, did not occur again until Letterman's pupil, James T. Ghiselin, became Sheridan's medical director in the Shenandoah in the fall of 1864. He followed Letterman's policy carefully and successfully. Letterman had taught well: he had proven his methods the one essential time.

[28] Letterman's report in *M.S.H.* Appendix, especially on pp. 103 and 104, seems to be in answer to Perley. Certainly affairs could not have been as favorable as Letterman claimed. Rife misery is hinted at or declared in Fatout (*op. cit.*, pp. 37-43), S. Emma E. Edmonds' *Nurse and spy in the union army* (Hartford, Connecticut, 1865, p. 309), and in other instances besides the statements of Perley and Whitman. Perley, incidentally, had a fine reputation late in December 1862 (*Amer. med. Times*, 27 Dec. 1862, p. 351). Surgeon General Hammond seemed to agree with Perley's remarks about the need for commissary officers: in his report for 1862 he asked for more medical storekeepers to relieve the medical purveyors (*Amer. med. Times*, 20 Dec. 1862, p. 345).

Rationalism in Early Eighteenth Century Medicine*

LESTER S. KING**

THE eighteenth century physician was expected to be a keen and discriminating thinker. He should, according to Boerhaave, be one who ". . . considers accurately every separate thing affecting the patient that may be learned by observation; compares them all with each other and collates them with the phenomena that occur in health; and then by rigorous and disciplined reasoning achieves knowledge of the proximal cause [of disease] and of remedies suitable for removing it."[1] Thus, he must observe accurately, reflect carefully, and reason soundly. Physicians of this type wanted medicine to be a science.

An ordinary artisan performs his functions by rule of thumb, but the scientific physician not only knows what to do but also knows why he does it. He then can *explain* his actions and can refer any given action to an established body of principles. The doctor, in preserving or restoring health, should act only with "sound reasons."[2] True medical theory consists in "rationally demonstrated explanation of all those things which are included in the histories of disease."[3] This is the eighteenth century rationalist attitude.

Empiricism, on the contrary, had little concern with theory. Empirical practice told what to do but not why it should be done. It did not seek explanations nor hunt causes other than those

* This work was supported by a grant from the National Institutes of Health (USPHS RG-9214).

** University of Illinois College of Medicine, Chicago, Illinois.

1 H. Boerhaave, *Aphorismi de cognoscendis et curandis morbis.* (6th ed., Louvain, 1752). Aphorism 13, p. 3.

In general the eighteenth century translations of Boerhaave leave much to be desired and in some crucial passages are incorrect. All translations in this paper are my own. The Latin text reads, "Qui denique omnia, quae aegro accidunt, observando cognita, adamussim ponderat seorsum singula, comparat deinde inter se universa, confert iis, quae in sanitate contingunt, hincque tandem severitate ratiocinii subacti assurgit in intellectum causae proximae, & auxiliorum ei tollendae aptorum, verum Medici nomen meretur."

2 F. Hoffmann, "Prolegomena de medicinae natura fundamentis et principio demonstrandi," in *Medicinae Rationalis Systematicae* (2d ed., 8 parts in 4 vols., Halle, 1729-1739), I, 4.

3 *Ibid.*, I, 10. "Theoria medica vera est rationalis & demonstrativa explicatio eorum, quae in historiis morborum continentur. . . ."

which were perfectly manifest. There was no concern with "hidden causes."

Physicians did not treat the term "cause" with any great philosophical subtlety, yet the problem was quite complicated.[4] In medical rationalism the most important feature was the so-called hidden cause. Causes were either manifest or hidden. They could be appreciated by either of the two modalities, sense experience (direct observation) or reason (inference). The simplest example of a manifest cause, directly observable, would be a case of Boerhaave: An infant suffered from fever, crying spells, and convulsions. Boerhaave could get no clue from the history, but when he undressed the infant for examination he found a needle sticking into the flesh. When this was removed, the entire "disease" vanished. Boerhaave declared that if he had not found the cause through examination, no medication would have restored health.[5]

No serious thinker would care to deny that the needle was the cause of the disease. Many agents, readily perceptible, are causes in this sense. Wounds and traumata of various sorts, extremes of temperature, poisons, too little or too much food or water, bad air, insufficient sleep are a few of these manifest agents. These for the most part form the so-called "non-naturals,"[6] and represent factors which may without cavil be termed "causal."

However, in the whole gamut of disease most causes are not so plainly manifest. They are neither directly apparent nor readily appreciated and so may properly be called hidden. But this single term includes concepts of vastly different nature.

The first category includes agents which, not directly observable, could nevertheless be readily seen if only we could penetrate below the surface. In a puzzling case, post-mortem examination may disclose the cause of the illness which was not apparent on external examination. The autopsy may reveal stones in the gall bladder or perhaps a "scirrhus" of the stomach or a "catarrh" in the mucous membranes. Such changes, "causal" in eighteenth century notions of disease, were hidden from direct sight but became directly observable if one performed the proper examination. It is in this sense that Morgagni spoke of *The Seats and*

[4] L. S. King, "Some problems of causality in eighteenth century medicine." *Bull. Hist. Med.*, 1963, *37*, 15-24.

[5] H. Boerhaave, *Praelectiones Academicae*. A. Haller, Ed. (5 vols., Turin, 1742-1745), § 744, note *Corporis*. (All references will be given in paragraph numbers. All quotations are my own translation.)

[6] *Ibid.*, § 744. I have dealt with this problem elsewhere (note 4).

Causes of Disease Investigated by Anatomy[7] or Benivieni described *The Hidden Causes of Disease*.[8]

Observable causes discerned through sense perception are thus of two sorts. They may be seen immediately, "by inspection," or they may be seen only after dissection and manipulation. The latter, although hidden, are essentially of the same nature as the former.

Rather different are those causes which are not only hidden from direct view, but by their nature *cannot be perceived*. Their very existence, as well as their nature and properties, must be inferred. They can be known only by "reason." Here again we may distinguish two types. First of all are agents too "subtle" to be seen directly and knowable only through their effects.[9] For example, while the subtle nerve fluid may not be directly visible, we cannot merely on this account deny its existence.[10] What could not be seen directly was considered to be material so fine that it transcended the capacity of direct perception.

This was one type of hidden cause discoverable through reason. Another type was not only imperceptible but did not have any material existence at all, e.g., the "powers," "faculties," or "virtues," of the Galenic tradition, or the immaterial agents such as the "archeus" or "anima" in Paracelsus, Van Helmont, and Stahl. Thus, from the standpoint of rationalism we may tabulate causes in the following manner:

A. *Manifest*: readily observable by inspection.

B. *Hidden*:

1. Observable by inspection but not very readily because of their location.
2. Not observable by inspection but knowable only by reason
   (a) material in character, but too subtle for direct perception
   (b) not necessarily material.

The most influential rationalists maintained that in science causes were eventually reducible to material particles, which alone were "real." This was the corpuscular or mechanical philosophy[11] whose adherents "by mathematical calculation estimate the forces

[7] J. B. Morgagni, *The seats and causes of diseases investigated by anatomy*. Benjamin Alexander, Tr. (3 vols., London, 1769).

[8] A. Benivieni, *The hidden causes of disease*. Charles Singer, Tr. (Springfield, Ill., 1954).

[9] Boerhaave, *Praelectiones*, § 730, note.

[10] *Ibid.*, § 289.

[11] Marie Boas, "The establishment of the mechanical philosophy," *Osiris*, 1952, *10*, 412.

of bodies from their mass, configuration, or velocity, whether through inference or direct perception."[12] On the other hand, rationalists like Stahl maintained the causal efficacy of an *anima* which, although it acted only through material agents,[13] was not itself material. The notions of "organism" and "organization," "goal" and "purpose," were contrasted with "mechanics," as then understood, and considered as a totally different order of being.

The corpuscular philosophers scorned any opposing view. Anything "occult" was considered not as something "hidden" but as something not "real," a product of imagination or mere speculation.[14] Another term of opprobrium was "hypothesis." The worst condemnation an eighteenth century rationalist could apply to an opponent was to label his doctrine "hypothesis," a concept which Cohen has recently analyzed.[15] The medical usage was wholly pejorative, corresponding to "philosophical romance."[16]

II

For medical rationalists the model of sound reasoning was geometry,[17] and rational medicine was to be reduced to a system based on first principles, from which all other propositions in medicine could be logically derived through deductive reasoning. While the method of geometry was considered the highest and most certain form of reasoning, repeatedly praised by physicians, it was not always clearly understood. An example of pathetic misconception is Pitcairn, who in his *Elementa Medica*[18] began his work with four postulates, 100 definitions, and 200 "propositions," yet had no notion of logical rigor. In actual fact, the physicians did not reduce their thought to mathematical simplicity or clarity but only praised the deductive method as an ideal to be approached.

In any deductive system the basic principles must be "real" and not imaginary. Any conclusions which rest on hypothesis (meaning mere imaginary concepts) will be completely overthrown if the initial principles are shown to be false. Boerhaave gave an interesting example. If, he said, a geometer should ascribe

12 H. Boerhaave, Oratio "De usu ratiocinii mechanici in medicina," in *Opuscula Omnia* (Hague, 1738), p. 10. ("Qui corporum vires, ex mole, figura, & velocitate, vel assumptis, vel deprehensis observatione, calculo aestimant Geometrico.")

13 G. P. Stahl, *Theoria medica vera,* (Halle, 1737), p. 20 (§ 48).

14 Hoffmann, *op. cit.,* I, 5-6.

15 I. B. Cohen, *Franklin and Newton,* (Philadelphia, 1956).

16 *Ibid.,* p. 139.

17 Hoffmann, *op. cit.,* I, 10; 42-3 (p. 10).

18 Archibald Pitcairn, *Elementa medicinae physico-mathematica.* (Hague, 1718).

to an oblique-angled triangle the properties of a right-angled triangle, "he could deduce a new system of geometry, entirely self consistent, but quite dream-like; and when the basic principle is overthrown, the whole system would collapse in ruins."[19] A non-Euclidean geometry would be consistent mathematics, but would not apply to the real world, since its basic principles were "imaginary."

It was in this sense that Boerhaave and Hoffmann criticized the works of Galen, whose logically excellent system rested on a small number of fundamental principles derived from Aristotelian metaphysics. Boerhaave enumerated these in detail[20] and indicated how they applied to particular problems. It would all be most admirable, except that the doctrines rested upon phantasy and day dreaming.[21] "Galen's entire theory rests on foundations constructed entirely from imagination, and metaphysical subtlety, and which led his followers into abstractions. But while they were grasping at clouds, nature meanwhile slipped through their hands."[22] Imagined properties cannot explain phenomena. Hoffmann similarly stigmatized Galenic medicine as relying on names and distinctions signifying nothing. In contrast the modern method depends on what is real and experiential (*experimentalis*) —on observation as well as reflection, judgment, and reason.[23]

Hoffmann was very explicit that the fundamental principle for explaining all medical phenomena was *movement* (*motus*).[24] The movement of the blood was the especial principle of health. The laws of health and disease were thus directly referable to the laws of motion as investigated in physics, that is to say, the laws of hydrostatics and mechanics.

This view was fairly widespread. Stuart in 1738 declared, regarding the explanation of muscular movement, that the basis of phenomena should be "a real and known principle in nature, as their universal cause acting by the known laws of mechanics and hydrostatics; the principle itself being as real, constant, and unchangeable in the present constitution of nature, as the principles

19 Boerhaave, *Praelectiones*, §20, note *Fallacia*. "Si geometrarum aliquis Triangulo obliquangulo tribuat proprietates Trianguli rectanguli . . . poterit inde deducere systema novae geometrae, severissime cohaerens, sed somnio simillimum, & subruto principio suo in proprias ruinas incubiturum."

20 *Ibid.*, §15, note *Ille*.

21 *Loc. cit.*, "mentis cogitabundae figmentis."

22 *Op. cit.*, §15, note *Damni*. "Theoria Galeni tota nititur fundamentis, quae ipsa imaginatione superstructa sunt, & subtilitate Metaphysica, quae posteros ad classes rerum, & abstracta abduxit, naturo interim elabente ex manubus eorum, qui nebulas captabant."

23 Hoffmann, *op. cit.*, I, 15-16.

24 *Ibid.*, I, 46-48.

of pure mathematics themselves." This method "has since been successfully imployed [*sic*] for unfolding several of the most mysterious phenomena of nature by the great Sir Isaac Newton, Mr. Boyle, Dr. Boerhaave, and other learned men . . . reformers of natural philosophy and physic in this and last century."[25] The entire tenor of Hoffmann and Boerhaave accords with these judgments.

III

The goal was to erect a deductive system of medicine, similar to geometry, whereby every phenomenon can be explained by derivation from the basic principles. Yet in science first principles cannot themselves be deduced, but must represent general concepts attained inferentially from experience. The problem was, in essence, how to get reliable principles and laws on which a sound medical system can be based. In the present paper we shall study the matter through the eyes of Boerhaave and Hoffman.

The physician learns from accurate observation. He attends to variations in circumstances, and from many individual observations he achieves general rules and laws of healing. He must also derive useful lessons from those cases in which the treatments were not successful.[26] All such observations may yield principles or laws, but only of limited generality, far too limited to serve as a base for any all-embracing system. Those truly general first principles arise rather from study of the two disciplines, anatomy and physics, considered in a broad sense, namely, as a precise knowledge of the human body and of the factors which can act upon it.[27] Through these disciplines, and only through these, can we acquire the basic knowledge for a sound theory. And from neglect of anatomy and physics arise all the errors of the various medical sects.[28]

The proper method rested on observation (or experience) and reason. These were the tools for achieving truth, but just how the tools were to be used was not clearly thought out. It was readily apparent that sometimes inferences were sound, other times not. It required no great acumen to assert that in general good reasoning differs from bad reasoning; the important problem is, how can you tell one from the other. There was, unfortunately, no

25 Alexander Stuart, "Three lectures on muscular motion," Supplement to *The Philosophical Transactions*, 1739, preface, p. x.

26 Hoffmann, *op. cit.*, I, 10-11.

27 *Ibid.*, I, 11-12; Boerhaave, *Praelectiones*, §29.

28 Hoffmann, *op. cit.*, I, 12-13.

orderly analysis. There were hints only, but no answers, to the question, "What distinguishes sound induction from unsound?"

Of the many difficulties one is linguistic. For example, the Latin word *experimentum* was used in somewhat diverse senses. Sometimes it seems to mean "experience" and to have the same force as *experientia*. At other times it indicates "experiment" as the term is now currently used. A further difficulty involves the concept "experience." On some occasions this term appears to mean merely a "fact" perceived without alteration, irrefutable, to be accepted as a brute datum. This is quite similar, apparently, to Locke's "simple ideas" provided by sensation. Boerhaave, in one place, regarded *experimentum* as "any phenomenon whatsoever, observable by aid of the bodily senses. Our mind adds nothing to the phenomenon beyond the mere perception."[29] On the other hand, the term "experience" will sometimes include not only bare sensory data but a certain amount of "reflection" as well, all so smoothly blended that a contrast cannot be made. This is clearly brought out in Hoffmann's usage (at least, at certain times), wherein "experience" seems to indicate not merely a passive observation but a combination of perceptive and reflective processes. True experience (*experientia*) "arises from many observations, very carefully and diligently noted, which encompass the entire history of the disease, with all relevant circumstances."[30] This usage places quite a strain on words. Clearly, if to have experience we must use "care" and "diligence," if we must somehow separate the relevant from the irrelevant, we are going far beyond the limits of simple awareness, and are using reflective processes indistinguishable from "reason." There is *evaluation* involved, a complex activity quite distinct from mere awareness of objective brute "fact."

"Experience" thus implies two features. There is as a basis something which can be called "observation," the stuff presented to the mind from "outside,"—the simple ideas of Locke. But—again perhaps using Locke's psychological analysis—this must be combined with something reflective furnished by the "mind." This interpretation of Hoffmann's meaning seems to accord with the intellectual currents of the time.

29 Boerhaave, *op. cit.*, §24, note *Sensibus*. "Experimentum vero dicimus respectu ad rem ipsam, qualecunque phaenomenon corporeum sensuum ministerio observabile. Mens nostra nihil addit praeter simplicem perceptionem phaenomeni."

30 Hoffmann, *op. cit.*, I, 9. "Vera experientia nascitur ex compluribus observationibus magna diligentia, attentione & cura notatis, quae integram morbi historiam, cum omnibus ad rem pertinentibus circumstantiis, complectuntur . . ."

Boerhaave, although he did not offer a systematic discussion, cast much light on contemporary rationalism. He accepted a basic distinction between something more or less "given" and something else added thereto by "reason." The general attitude was that "facts" provided through *experimenta* do not err. *Error arises when we reason incorrectly about facts.* However, Boerhaave did not clearly set forth the degree to which "facts" and "inference" were initially commingled in any given *experimentum*. One great drawback in early eighteenth century thought was the failure to analyze this *experimentum* for sources of error and misinterpretation. "Observations" were accepted without any adequate critique of validity, and once accepted were then distinguished from "reason."

Declared Boerhaave, "We have experiments in physics, anatomy, botany, chemistry, medical practice. All of these *we must completely accept,* in so far as they are experiments [or, in so far as they are matters of experience]." But when we try to draw inference from these data, then we may err. To avoid error, "nothing is to be added to the data, unless it can be inferred therefrom by *strict principles of reasoning.*"[31] However, from what we discern empirically we may safely accept the inferences that "clearly follow."[32]

The foundations of medicine require accurate observation of phenomena in health and disease, and then derivation through reasoning of those things which are hidden from the senses. This can be achieved only when through precise reasoning "the data of experience are tested, examined in all their characteristics, then scrupulously compared one with the other, to disclose the similarities and differences."[33] Thus are contrasted the observation initially given and something else initially hidden but inferred from the facts through reason.

Boerhaave then indicated that conclusions drawn from reason would be "just as secure and trustworthy as the original observa-

31 Boerhaave, *op. cit.*, §19, note *Secta* (italics mine). "Habemus experimenta Physica, Mechanica, Anatomica, Botanica, Chemica, Practica, ea omnio debemus admittere, hactenus qua experimenta sunt, neque adjicienda datis, nisi quae ex ipsis deducuntur severa lege ratiocinii."

32 *Ibid.*, §289, note *Mirum.* "non ideo fides erit deroganda iis propositionibus, quae evidente nexu sequuntur ex sensuum apparitionibus."

33 *Ibid.*, §24. ". . . (a) data experimenta, singulatim perfecte expensa, (b) in omnibus proprietatibus examinantur, (c) dein inter se comparantur sedulo, ut convenientia, vel diversitas patescat, (d) tumque prudentissima fide notantur ea omnia, quae in iis contineri perspecta clare inde deduci possunt."

tions."[34] This claim, that through reason we attain assurance just as solid as that derived from sense experience, is perhaps the essence of rationalism. It is not synonymous with the Platonic tradition that the unseen achieved through reason has greater reality than sense experience. But the rationalists moved in this direction when they maintained that conclusions attained by reason were as reliable as direct sensory perception.

It was thus especially important to distinguish sound reasoning from unsound. In the eighteenth century there was all too much bickering of the type, "What I say is truth, based on sound reasoning, but what you say is error, founded only on 'hypothesis.'" But there was also a realization that, somehow, criteria for truth must be found. The seventeenth century had provided one criterion in the "clear and distinct idea" of Descartes, who assumed that such an idea needed no further guarantee of certainty. That an inner assurance could serve as a guarantee of truth was widely accepted in the seventeenth century.[35]

The tragedy of rationalism was that the certainty of a mathematical system did not seem to apply to the medical world. In medicine first principles could not be achieved by intuition. They were not self-evident. Boerhaave indicated this when he discussed some distinctions between truth and opinion. Opinion, he said, is the body of doctrine which, while accepted by many, is nevertheless not so clear and evident that it compels assent from every clear-thinking person who is learned in his profession.[36] Of course, only those who were skilled in their profession were entitled to have an opinion. But even so there was the difficult problem, how did it happen that everyone did not perceive the light so dazzlingly clear to some?

Boerhaave pointed out a few sources of error whereby reason may go astray. For example, experiments may be interpreted according to preconceptions, or conclusions may be rashly drawn from too few experiments.[37] Or we may have valid conclusions derived from one set of data, but if we apply these conclusions to another set of data, we may fall into error. Thus, the material

[34] Boerhaave, *loc. cit.* "Neque vero posteriora haec prioribus minus firma, vel fida erunt."

[35] Basil Willey, *The seventeenth century background* (London, Chatto and Windus, 1957, p. 73.

[36] Boerhaave, *op. cit.*, §19, note *Secta.*

[37] *Ibid.*, §19, note *Causis.*

changes which chemistry describes as occurring under the influence of fire are *true*. But applying these conclusions to other bodies and asserting that the same changes take place in the human economy may be fallacious.[38] Without using the particular phrases, Boerhaave cautioned us against applying *in vivo* those conclusions derived *in vitro*. Similarly, although the laws of mechanics are eternally true, they do not explain the behavior of a magnet. We can err if we apply established laws to other areas which have not been sufficiently studied.[39]

What is true under one set of circumstances may not be true under changed circumstances. Remedies may be effective in a given disease. But if you apply the same remedy to a case which manifests some other disease, or even to the same disease under different circumstances, you may err.[40] What Boerhaave seems to be saying in all these examples is that we may not safely apply established laws to new individual cases unless we know that the new cases are *similar* to the cases from which the law was originally derived. A law, he said, may apply to a thousand cases, and yet there may be an exception in the very next instance. But he did not indicate how we can be confident of similarity nor how we can safely make inductive generalizations with reasonable assurance of validity.

Even worse than assuming a similarity where in fact none exists is excessive haste in drawing conclusions. Boerhaave pointed out that errors arise not so much from weakness of reason as from impatience. We must not assert relationships before we have "sufficiently" examined the data. Instead, we should suspend judgment until the necessary data are available. For example, the ancients who claimed the heart as the source of body heat drew wrong conclusions from the evidence, and eventually were proven wrong by Harvey. The ancients had generalized too hastily and should have delayed drawing conclusions. This admittedly would have been difficult. "Who indeed," queried Broehaave, "would suspend his judgment throughout the 2200 years which have elapsed from the time of Hippocrates? This would be confessing ignorance concerning something of outstanding importance. But," he continued with complete disregard of realities, "it should have

[38] *Ibid.*, §19, note *Secta*.
[39] *Loc. cit.*
[40] *Loc. cit.*

been done anyway, for only by such patience can medicine [ars] be purged of its errors."[41]

When there are uncertainties we must wait for "experiments" —concrete observational data—rather than fill in the gaps by "hypotheses." To be sure, inferences achieved by "sound reasoning" may have the force of experience and command assent just as does observation. Yet Boerhaave declared, "Where there are doubts which cannot be resolved except by hypothesis, we must proceed very slowly, and realize that future generations will resolve the uncertainty when experiments, which we have not yet made, will have kindled the light for them."[42] To show how he himself was willing to exert caution and not rush into hypothesis, he indicated areas where no conclusions should be drawn: the function of the spleen, the medicinal virtues of many plants, the cause of plague and smallpox. Concerning these we should remain without any opinion until time shall have brought forth the truth.

The admonition to suspend judgment rather than propound theories that might be wrong indicates how narrow were the prevailing views of "hypothesis" and "inference." That through reason we might anticipate experience, propound a theory, then verify or disapprove it through suitable experiment, was not a significant part of then current methodology. To be sure, in one place Boerhaave indicated that "we do not seek [new truths] through chance observations, but through experiments directed by the mind towards certain goals."[43] This suggests that experiments might be planned in order to prove a particular theory. Boerhaave was not a total stranger to this procedure, as I have indicated elsewhere,[44] yet he rarely pursued this methodology or manifested real awareness of the concepts of verification.

IV

The eighteenth century rationalists did not answer the question how to distinguish sound reasoning from unsound. If the reasoning were hasty, or if analogies were unsound, error resulted.

41 *Ibid.*, §19, note *Posteriorem*. "Verum quis per 2200. annos, qui ab *Hippocrate* elapsi sunt, judicium suum suspendat? fateretur se aliquid, & praecipui in arte momenti, ignorare. Sed oportebat tamen: & ea sola patientia ars potest repurgari ab erroribus, confirmari, mascula, & conscia proprii roboris fieri."

42 *Loc. cit.* "Quare ubi dubia occurrunt, non solubilia nisi per hypotheses, pes figendus est, cogitandum, soluturos dubium posteros, postquam lumen iis accenderint experimenta nondum a nobis facta."

43 *Ibid.*, §24, note *Ratiocinatione*. "Eas [novas veritates] ab experimento fortuito non expectamus: sed ab experimento a mentis imperio in certos fines instituto."

44 L. S. King, *The medical world of the eighteenth century* (Chicago, University of Chicago Press, 1958), pp. 99-100.

But this does not tell us whether in any given case there *was* excessive haste nor whether analogies were *really* sound. While their concepts of scientific method were obviously inadequate, it is not so obvious just what handicaps interfered with achieving a sound methodology.

A medieval heritage was the great desire for system built upon incontrovertible first principles. While mathematics presented the perfect model of such a system, physics was considered to be a very satisfactory example. And the laws of physics, together with those of "anatomy," were adopted as the "first principles" of medicine. Now, while the great physicians had first-hand acquaintance with anatomy, when they adopted the principles of physics, they were accepting these principles second-hand. Yet without direct first-hand experience they were not competent for any truly critical thinking in the area of physics. Boerhaave indicated that it was not necessary that the basic principles of a science be demonstrated in the science itself, but it was sufficient if these principles were established by some other science.[45] This was a clue to the faults of the period—the willingness to accept the principles of another science and then to assume relevance to a different field.

There were two unfortunate consequences of this maneuver. In the first place, lack of first-hand acquaintance prevented any true critical judgment. It was comparable to a man who tries to prescribe medicines out of a book, without any first-hand knowledge of sick patients or action of drugs or course of disease. He would lack power of sound judgment or critical evaluation in concrete situations. These come only with experience, and it is not possible to have judgment if we lack experience.

Hoffmann and Boerhaave, then, skilled as they were in clinical medicine, simply did not have adequate experience in physics to exert critical judgment where physics related to medical theory. Boerhaave, to be sure, was a very competent chemist, but he based little of his medical doctrine on chemical principles. He and other medical leaders relied predominantly on physical concepts which, so to speak, they got out of a book rather than from first-hand experience. Their "feeling" for physics was on a verbal plane, resting on shadow rather than substance.

A second drawback of the systematist attitude was insufficient attention to induction. "Proof" centered chiefly on deduction, and "demonstration" was made from the "application" of first

[45] Boerhaave, *op. cit.*, §25, note *Demonstratio.*

principles.[46] Demonstration he defined as "bringing [deducing] a doubtful proposition into that degree of clearness that it cannot be denied by anyone who admits the general axioms."[47] It is this deductive process which gives complete reliability. It is through this process that reason can yield conclusions which are just as certain as "facts."

And yet Boerhaave also indicated another and quite different function of reason. When the physician confronts "facts" (*experimenta*), it is, he said, the function of reason to note and compare similarities and differences among all the various properties and then to note everything which can be inferred therefrom.[48] The Latin is *deduci,* which can be translated equally "infer" or "deduce," for either will satisfy the meaning of "derivation." But whereas the principles and rules of deduction were quite adequately established, the principles of induction were but feebly understood. To say that the function of reason is to note similarities and differences is to fall back on the doctrines of Francis Bacon, who thought that by examining many instances of a phenomenon and then drawing up "Tables of Similarity" and "Tables of Difference," general laws and conclusions would automatically emerge.

With such an attitude it was not possible to achieve any grand inductive generalizations. There was needed a synthesis between what the eighteenth century writers called "imagination" and what they called reason. There had to be a freedom to build imaginative constructs, but there was also required a technique for relating these constructs to actual observations, and doing so with some degree of rigor. The eighteenth century rationalists wanted to avoid imaginary concepts, but they had no hesitation in asserting relationships and connections which were only imaginative. We might suggest that they used their imagination in the wrong way.

When Boerhaave and Hoffmann, for example, asserted various conclusions, they did so in good faith. They believed that available evidence actually did support their concepts in a logical manner which exemplified "sound reason." They did not distinguish between concepts for which sound proof was available, those for which evidence was lacking, and those for which evi-

[46] *Ibid.*, §25.

[47] *Ibid.*, §25, note *Demonstratio.* "Quae est dubiae propositionis deductio in eam evidentiam, ut a nemine negari possit, qui generalia Axiomata admiserit."

[48] *Ibid.*, §24.

dence, while suggestive, was insufficient and should be sought further. That concepts might lack adequate evidence yet have value enough to warrant a deliberate search for more evidence, that concepts might be readily modified or abandoned as new evidence was forthcoming, were forms of scientific method not yet accepted. Such an attitude would require flexibility, and the rationalist temper was, unfortunately, not flexible: if truth was eternal and if "reason" could achieve the truth, all that was necessary was to reason more carefully.

Boerhaave did point out a few pitfalls in the reasoning process. The essential error, he thought, was being too hasty, the essential remedy was to wait until more evidence was available. But the deliberate testing of concepts, the deliberate search for evidence bearing on specific points, were too rarely done. It was much easier to rely on reason, to have the sublime self-confidence that, however fallacious the views of your opponents, your own reasoning was sound.

Progress required a new empiricism. The elements of a new attitude were indeed already present but not sufficiently developed. There was a dim awareness that a rigid separation between "observation" and "reason" was not possible but that "experience" necessarily carried with it some degree of "reflection." There was an awareness that theory rested on experience, but not yet the realization that sound theory was built on first-hand experience, not on doctrines taken from books.

Progress came from two sources. In the mid-eighteenth century there developed a tremendous upsurge in empirical investigation, especially in what we may call the biological sciences. Different disciplines brought forth vast new masses of fact, facts that were not "committed" but were material for new theories or for revision of the old. New data slowly produced a more critical attitude towards older ideas, forcing sharper discrimination and evaluation and yielding a new appreciation of what constitutes valid evidence.

In the second place, system-making underwent important modifications. Although Boerhaave and Hoffmann derived their first principles from physics, another current maintained that living beings had special principles of their own and that we cannot explain medical phenomena without reference to these principles. This doctrine, vitalism, had as its chief exponents Stahl early in the century and Sauvages and Bordeu in the middle years.

They tried to derive their first principles from first-hand observation of functioning living organisms rather than from the laws of physics.

The period of approximately 1740 to 1765 was crucial in the development of medical thought. Medical theory became dependent more on "biology" than on mechanics. Rationalism began to blend with a newer, richer empiricism to produce what eventually became modern scientific method. Philosophy began to exert a sharp critique on scientific doctrine. Even though around the year 1740 the rationalistic systems in medicine seemed firmly established, the seeds of their decay can be glimpsed as we look back on the era.

Friedrich Loeffler and the Thessalian Field Mouse Plague of 1892

DEXTER H. HOWARD*

I

FRIEDRICH August Johannes Loeffler was born 24 June 1852 at Frankfort on the Oder, Germany. His father, Gottfried Friedrich Franz Loeffler, was a distinguished army physician, who worked indefatigably throughout his life to raise the status of doctors in military service. Gottfried Loeffler was a Sub-Director at the Kaiser Wilhelm's Akademie für das militärärztliche Bildungswesen in Berlin and eventually attained the rank of Generalarzt with the title of Professor. His work with the military was recognized by the conferment of the Iron Cross (1st class) and, after his death, by a marble bust in his memory at the Academy.[1]

After receiving his early education at Marburg, in the Gymnasium zum grauen Kloster, and in Berlin, at the Collège Royal Français, Friedrich Loeffler undertook the study of medicine at Würzburg. His choice of medicine as a field of study was obviously influenced by his eminent father and by his oft-expressed inclination to the natural sciences. Loeffler's studies were interrupted briefly by the Franco-Prussian War during which he served as a hospital assistant. He completed his medical training at Kaiser Wilhelm's Akademie in Berlin (1874) and was stationed as a military surgeon in Hannover and Potsdam.[2]

On the 1st of October 1879 he was ordered to the newly established (1876) Kaiser Wilhelm Gesundheitsamt in Berlin. In June of 1880 he became associated at this institute with Robert Koch, an event which was to influence the entire course of his career in

* Department of Medical Microbiology and Immunology, School of Medicine, University of California, Los Angeles.

1 Biographical material on Gottfried Loeffler was obtained from: Pagel, J. L. *Biographisches Lexikon hervorragender Ärzte des neunzehnten Jahrhunderts.* Berlin, Urban und Schwarzenberg, 1901, 1,983 pp. with portraits of G. and F. Loeffler; Nuttall, G.H.F. Biographical notes bearing on Koch, Ehrlich, Behring and Loeffler, with their portraits and letters from three of them. *Parasitology,* 1924, *16,* 214-238.

2 Biographical material on Friedrich Loeffler was compiled from the following sources: Abel, R. Friedrich Loeffler. *Zbl. Bakt.,* 1915, *76,* 241-245; Bulloch, W. *The history of bacteriology.* London, Oxford University Press, 1938, 406 pp.; Duclaux, E. *Pasteur. The history of a mind.* Philadelphia, W. B. Saunders Co., 1920, 363 pp.; Gaffky, G. Friedrich Loeffler. *Dtsch. med. Wschr.,* 1915, *41,* 593-595 with portrait; Garrison, F. H. *An introduction to the history of medicine.,* ed. 4, Philadelphia, W. B. Saunders Co., 1929, 996 pp.; Nuttall, G. H. F. (note 1); Pagel, J. L. (note 1).

bacteriology. Loeffler expressed his appreciation for the opportunity of working with Koch when he wrote:

> The memory of those days, when we still worked in this room, Koch in the center and we about him, when almost daily new wonders in bacteriology arose before our astounded vision, and we, following the brilliant example of our chief, worked from morn to eve and scarcely had regard to our bodily needs—the memory of that time will remain unforgettable to us. Then it was that we learnt what it means to observe and work accurately and with energy to pursue the problem laid before us.[3]

Loeffler assumed his duties in Berlin at the beginning of the "Golden Era of Bacteriology," a period of time so-named because it witnessed the discovery of so many infectious agents of disease.[4] In keeping with the spirit of these years and no doubt under the critical eyes of Koch, Loeffler's initial work in bacteriology included the first isolation of the glanders bacillus (with Schütz, 1882),[5] observations on the bacterium of swine erysipelas (1886),[6] and his definitive work on the diphtheria bacillus (1884).[7]

He was transferred from the Gesundheitsamt in 1884 to the post of director of the chemistry and hygiene laboratories of the 1st Garrison Hospital, where he lectured on sanitation and hygiene. In 1886 he was appointed Privatdocent in hygiene at the University of Berlin. The following year he collaborated with O. Uhlworm and R. Leuckart in founding the *Centralblatt für Bakteriologie und Parasitenkunde* and wrote the first part of an excellent history of bacteriology[8] which was left unfinished.[9]

In 1888 Loeffler accepted an appointment as professor of hygiene of Greifswald. It was here that he undertook his work on the bacterium of mouse typhoid (*Salmonella typhi-murium*),[10] which eventually led him to travel to Thessaly and there to initiate one of the first extensive field trials on the use of microbes in the biological control of animal population. This experience, which was so fascinatingly chronicled by Loeffler himself,[11] has not

3 Quoted by Gaffky, G. (note 2). Translation by Nuttall (note 1).

4 Dubos, R. J. *Louis Pasteur. Free lance of science.* Boston, Little Brown & Co., 1950, 418 pp. (p. 260).

5 Wilson, G. S. and Miles, A. A. *Topley and Wilson's principles of bacteriology and immunity.* Baltimore, Williams & Wilkins Co., 1955, 4th ed. 2 vols., 2,331 pp. (p. 576).

6 *Ibid.*, p. 479.

7 *Ibid.*, p. 536.

8 Loeffler, F. *Vorlesungen über die geschichtliche Entwickelung der Lehre von den Bakterien.* Leipzig, F. C. W. Vogel, 1887, 252 pp.

9 Garrison (note 2).

10 Loeffler, F. Ueber Epidemieen unter den im hygienischen Institute zu Greifswald gehaltenen Mäusen und über die Bekampfung der Feldmausplage. *Zbl. Bakt.*, 1892, *11*, 129-141.

11 Loeffler, F. Die Feldmausplage in Thessalien und ihre erfolgreiche Bekämpfung mittels des *Bacillus typhi-murium*. *Zbl. Bakt.*, 1892, *12*, 1-17.

been extensively reviewed by his biographers;[12] yet it marked the beginning of a long succession of similar biological control programs which continued long after his death. As we shall see, Loeffler never followed up his initial field work, but his observations in Thessaly became a model for subsequent experiments by others.

II

Pasteur, most likely, originated the idea of employing infectious agents in the control of economically harmful animal populations.[13] In 1882 he suggested that the causative microorganism of some infectious disease occurring naturally in the plant louse, *Phylloxera vitifoliae,* might be used in the control of phylloxera which was then quite troublesome to French vineyards.[14] Although none of the practical aspects of his idea was ever worked out, Pasteur returned to the basic concept a few years later under the following circumstances.[15] About the year 1860 Australia and New Zealand had improved the European rabbit (*Oryctolagus cuniculus*). The animals thrived in their new environment and soon overran the two countries, consuming enormous quantities of grazing plants. In desperation the government of New South Wales offered a prize of £25,000 for an effective suggestion of control of the destructive rabbit plague. Pasteur, competing for this prize, suggested that grass from around the burrows be cut, contaminated with cultures of the chicken cholera bacillus (*Pasteurella multocida*), which he knew to be virulent for the European rabbit, and spread out in accessible places.[16] He reasoned that ingestion of the infected grass would initiate diseases which would quickly spread through the rabbit population. Shortly after the presentation of his plan, he was given the opportunity of testing it on a small scale in the field. Madame Pommery, the owner of a champagne firm, complained to Pasteur[17] that rabbits were troublesome pests in wine cellars, and that no effective control measures were then known. Loir, a laboratory assistant,[18] was sent to the Pommery estate to initiate an anti-rabbit campaign. The complete

12 Note 2.

13 Dubos (note 4), p. 310.

14 Dubos (note 4); Seymour, E. L. D. *The new garden encyclopedia.* New York, Wm. H. Wise and Co., Inc., 1946, 1,380 pp. (p. 590).

15 Dubos (note 4), pp. 311-312.

16 Pasteur, L. Sur la destruction des lapins en Australie et dans la Nouvelle-Zélande. *Ann. inst. Pasteur,* 1888, 2, 1-8.

17 *Ibid.*

18 Also Pasteur's nephew (Dubos, R. J., note 4, p. 405).

success of this initial effort encouraged Pasteur to send Loir to Australia in order to put the idea to a test on a larger scale. However, the Agriculture Department of that country decided not to authorize the tests, and Pasteur's anti-rabbit offensive was never mounted.[19]

Four years later Loeffler travelled to Thessaly to wage microbiological war on the field mice then ravaging that area and thus to perform the first extensive field trial of Pasteur's concept.

III

Loeffler introduces his paper on his experiences in Greece with these words:

> In the middle of March of this year the information appeared in all the newspapers, that according to telegraphic communications from Larissa the plain of Thessaly was besieged by myriads of field mice, which threatened the whole harvest.[20]

The periodic devastation of field crops by voles has been a common experience of European farmers. It has been estimated that few Europeans living during the last seven hundred years could have failed to experience at least one large mouse plague.[21] For reasons as yet unknown, populations of voles suddenly reproduced in enormous numbers and broke out to devour almost all types of crops. Numerous accounts of such plagues present an endless succession of stories of ineffectual efforts to combat the hideous hordes of vermin. In the words of Charles Elton:[22]

> The accounts of these plagues abound in military metaphors, which testify to the serious threat that mice can offer to country people. We read of invasions, advances, attacks on crops, squadrons of mice, campaigns, victories, and defeats. Everything takes place on a huge scale. It is difficult for us in this quiet country [England] to realize that an area of farm-land equal in size to all the plantings made by the British Forestry Commission during the last eighteen years may be ravaged by mice; that the damage runs into millions; that hundreds of villages turn out to make war on the pests; and that this happens, not just once in a generation, but sometimes twice or more in ten years.

Early in the year of the Thessalian mouse plague, Loeffler had reported on a new bacteriological method of control of field mice.[23]

[19] Rabbits have continued to plague Australia and in recent years microbiological control measures have been effected. The myxomytosis virus was substituted for the chicken cholera bacillus as the infectious agent, but the idea remains the same. Details of the methods of procedure and relative success of the operation have been recorded: Fenner, F. The rabbit plague. *Sci. Amer.*, 1954, *190*, 30-35.

[20] Loeffler (note 11), p. 1.

[21] Elton, C. *Voles, mice and lemmings*. Oxford, Clarendon Press, 1942, 496 pp.

[22] *Ibid.*, p. 13.

[23] Loeffler (note 10).

The Greek government, having learned of his observations through their ambassador in Berlin and by a telegraphic reference from Pasteur, wrote to Greifswald on 29 March 1892 and requested cultures of *S. typhi-murium* to be employed in mouse abatement programs. Loeffler recognized the situation as a rare opportunity to try out his new method of control under actual field conditions. In his original studies he had shown that the bacterium of mouse typhoid was infectious for the house mouse (*Mus musculus*) and for the field mouse (*Microtus arvalis*) but not for other animals such as cats, rats, rabbits, guinea pigs, swine, small birds, chickens, and pigeons. He appreciated the fact that to be useful in combating field mouse plagues his bacterium would have to be harmless for important farm animals, and preliminary studies had revealed that large doses could be fed to sheep without development of symptoms. He reasoned that animals larger than sheep, such as horses and cows, would also remain unharmed.[24] Thus he was of the opinion that field trials with *S. typhi-murium* could be undertaken with safety, since sheep were almost the only important farm animals in the besieged area of Thessaly.

Loeffler's experiments had established that mouse typhoid would spread from animal to animal housed in cages. He felt that the disease would also spread among field mice in nature by contamination of food source with excrement of infected animals. However, he postulated that the infection could be disseminated more rapidly and more effectively if the bacillus could be distributed over a wide area in the food of the animals.[25] Wishing to put his ideas to the test himself rather than entrusting them to others Loeffler wrote to the Greek ambassador requesting travel funds for himself and for an assistant, and a place of residence while conducting the trials. On 1 April 1892 he received word from the Greek government that he was invited to come on his conditions.

In the company of Abel,[26] whom he took as his assistant, Loeffler left Berlin on 5 April and arrived in Athens on 9 April. The following morning the two investigators were introduced to the chief of the Bacteriology Laboratories in Athens, Dr. Pampoukis, who was charged with the responsibility of conducting them to the

[24] This reasoning was apparently based on the relative size of the animals (note 11, p. 2).

[25] Loeffler's thinking in this regard was undoubtedly influenced by Pasteur's earlier speculations on biological control of rabbit populations (note 11, p. 11).

[26] Rudolf Abel was a bacteriologist and hygienist who was an assistant to Loeffler at Greifswald. He wrote an adulatory tribute to his former chief in 1915 (see note 2).

site of the field trials. A vole which had been shipped from Larissa to Athens was shown to Loeffler. At first glance he immediately noted that the species of vole ravaging the Thessalian fields (*Microtus hartingi*)[27] was not the same as the one he had worked on in Greifswald (*M. arvalis*).[28] However, a few preliminary inoculation studies demonstrated to him that the Thessalian vole was even more susceptible than its European counterpart.

The next problem which faced Loeffler was the production of enormous quantities of *S. typhi-murium* with which to contaminate the food to be distributed over the besieged fields. He had hoped to find in Athens a large steam apparatus in which to sterilize the large amount of culture media needed to grow the organism. However, such a piece of equipment was not readily available and he had to settle for a rather small steam sterilizer found in the kitchen of the University Hospital. The large glass containers filled with culture media prepared in the Hospital kitchen did not withstand the heating procedure necessary to effect sterilization and Loeffler had to use large milk cans for culture vessels. These worked beautifully, and a very large batch of *S. typhi-murium* was prepared. As a safeguard, Loeffler also prepared a number of agar slant cultures of the organism. He reasoned that if the culture grown in milk cans spoiled in transit to the fields, he could use such agar cultures to impregnate water and then soak the food in the polluted water.

All of these preliminary observations consumed but a week, and on 16 April Loeffler, Abel, and Pampoukis left by boat for Volo with their cargo of *S. typhi-murium* cultures. From Volo they travelled by train to Larissa, the capital of Thessaly, arriving on the 18th of April. The following is an abridged account of Loeffler's description of the situation in Thessaly:[29]

> The train cuts through a wide plain which is bordered on the east by the Kissavos and on the north by the snow-capped Olympus. Toward the west the boundary is formed by a chain of low hills. This plain is the one predominantly besieged by the voles. The whole of Thessaly is really one vast plain bordered by mountains, and divided by the range of hills just mentioned into the plain of Larissa and the plain of Trikala. It is traversed from west to east by the river Peneios. The soil is extremely fertile, heavy, and in many places reddish loam, which is often inundated by the

27 Elton (note 21), p. 65.

28 Loeffler had been assured by telegram before leaving Greifswald that the species of vole in Thessaly was the same as the one in Germany (note 11, p. 4).

29 This account is an abridgement prepared by Elton (note 21) of Loeffler's original description (note 11).

Peneios in winter over a large extent of country. . . . This vast fertile plain is for the most part the property of large landowners. . . . The comparatively small number of inhabitants is of course insufficient to cultivate these extensive flats. Very large districts, perhaps more than two-thirds of the country, lie fallow .The fallow lands are used to pasture large flocks of sheep, goats, and herds of oxen. About every three years the same tracts of land come into cultivation. . . . In these extensive fallow fields the vole can multiply undisturbed. Last year the harvest was a good one. . . . The field voles, which have always been plentiful in Thessaly . . . multiplied on account of the good harvest. . . . At the beginning of March (1891) the voles were only beginning to troop from the slopes of the hills and the fallow-lands of the cultivated fields . . . when the . . . sun dried up the fallow-fields at the end of May 1891, as happens every year, the mice invaded the cultivated fields . . . and caused such terrible ravages in a short time that last year scarcely any harvest was gathered.

Loeffler and his party were received with mixed feelings by the peoples of the besieged area. Previous abatement programs including the use of poisoned food, the distribution of metal traps over the fields and the application of carbon disulfide had been ineffective. The Greek landowners, therefore, looked forward to Loeffler's field experiments and were prepared to cooperate in every way possible in the execution of his plan. The peasants, however, were mostly indifferent to the plague and the Turkish landowners considered the plague to be an act of God which was to be endured. Very little cooperation was expected from these two groups of people, and accordingly the experiments were undertaken on the property of the Greek landowners who were most sympathetic to the goals of the program. The apathy of the peasants was overcome by eliciting the assistance of the local police force to see to it that the peasants carried out instructions.

The general plan for the dispersal of the bacterium over the fields was as follows. From their headquarters in Larissa Loeffler and members of his team would travel to one of the estates in the area. Large kettles were filled with the broth culture previously prepared in Athens or with water contaminated with the growth from some of the agar cultures. Peasants, sent by the soldiers in the various surrounding towns, brought quantities of bread which they soaked in the infected fluid. After the pieces of bread had absorbed the liquid, they were removed by hand by the peasants and carried back to the fields in wicker baskets where they were distributed at the burrows of the animals. Experimental feedings of large land animals produced no observable illness, and one landowner was so convinced of the harmlessness of the cultures for

humans that he himself ingested a piece of contaminated bread.[30]

This dispersal procedure was repeated at several points. Soon thereafter, reports of large numbers of dead animals were made to the group at Larissa. Such reports constituted for Loeffler adequate evidence that the method had proved its practical usefulness. Thus, after committing the details of the procedure to his Greek associates, Loeffler returned to Greifswald. On 26 May 1892 he received the following telegram from Anastassiades, who was president of the Vole Commission of Larissa: "Résultats excellents partout, pays reconnaissant à vous." In concluding the report of his experiences Loeffler expressed the opinion that *S. typhi-murium* was a micro-organism which would kill the destructive rodent and could be used with ease, since it did not cause disease in other animals.

This appraisal of success in Thessaly did not long go unchallenged. A British Commission on voles[31] found that the Thessalian landowners agreed that Loeffler's method was good, but they also pointed out that some parts of the land were still vole-infested in spite of application of the method. Turkish landowners, apparently skeptical from the beginning, had sent to Mecca for holy water to exorcise the mice, a method they had employed before Loeffler's visit. Pasteur expressed the opinion that Loeffler had not established that the vole plague was abated or, if indeed it were, that the application of bread soaked in cultures of *S. typhi-murium* had had anything to do with it.[32]

In spite of these criticisms, to which Loeffler never publicly replied, interest in the use of *Salmonellae* in biological control programs was maintained by others. The discovery in 1893 of another strain of *Salmonella* ("Danysz virus"),[33] thought to be more effective than *S. typhi-murium,* shifted interest away from the latter

30 There is no record of the fate of this individual but presumably he suffered no ill-effects. This experience together with the fact that the contaminated bread was handled by the peasants served to convince Loeffler of the safety of using *S. typhi-murium* in control programs. A few years later, however, human infections with this *Salmonella* were reported (Mayer, C. Über die Verschleppung typhöser Krankheiten durch Ameisen und die Pathogenität des Loeffler'schen Mäusetypusbazillus für den Menschen. *Münch. med. Wschr.*, 1905, 52, 2261-2262). Thus Loeffler's opinion with regard to the safety of the program was not substantiated. It is difficult to understand why human cases of salmonellosis were not reported during the extensive Thessalian field trials.

31 Maxwell, H. E. Memorandum by the chairman upon a visit to Thessaly in January 1893. In Preliminary report (C. 6943) on "A plague of field voles in Scotland," Appendix 8, p. 92-93. Material taken from Elton (note 21), p. 66.

32 Elton (note 21), p. 66.

33 Elton (note 21), p. 34.

organism as a rat poison.[34] Extensive field trials with the new *Salmonella* were initiated in France,[35] and from that time until the present there has been a long succession of commercial products, containing various species of *Salmonella,* highly recommended for rodent abatement programs. Unfortunately, there has never been unanimity of opinion on the efficacy of these products. Oftentimes they have been employed to a saturation point much as a chemical poison would be used. Under these circumstances they unquestionably kill enormous numbers of mice, but they do not accomplish the original goal of biological control: that of induction of a large-scale epidemic from a point source.

The gradual realization that the *Salmonella* sp. employed are far from innocuous for man argued against their use in biological control programs, and products containing these micro-organisms have been largely abandoned.[36]

IV

Although Loeffler never returned to field mouse abatement programs, his interest in problems of public health was by no means terminated. In 1897 he was made chairman of a German commission for the investigation of foot and mouth disease, and with Frosch and Uhlenhuth he performed extensive experiments on this disease. During the course of these studies, he and Frosch established that the infectious agent of foot and mouth disease passed through filters which retained bacteria.[37] This was the first time that a parasite of mammals was shown to possess this property[38] and led to the use of the term "filterable virus" to characterize such parasites.[39] Loeffler and his collaborators went on to study the induction of immunity in foot and mouth disease.

In addition to the preceding studies Loeffler is remembered for his work on disinfection, milk hygiene, sewage disposal, bacteri-

34 A lucid description of the discovery and development of the Danysz bacillus as well as a history of the use of microbiological agents in the control of rodent plagues has been written by Elton (note 21), p. 28-47.

35 Elton (note 21).

36 Elton (note 21).

37 Loeffler, F. and Frosch, P. Berichte der Commission zur Erforschung der Maul- und Klauenseuche bei dem Institut für Infectionskrankheiten in Berlin. *Dtsch. med. Wschr.,* 1898, *24,* 80-83.

38 Beijerinck had shown a similar property for the agent of tobacco mosaic disease (Ueber ein Contagium vivum fluidum als Ursache der Fleckenkrankheit der Tabaksblätter. *Zbl. Bakt.,* abt. 2, 1899, *5,* 27-33). Some years earlier Iwanowsky had reported the transmission of tobacco mosaic by bacteria-free filtrates, but the full significance of his observation apparently was not appreciated until the work of Beijerinck, and of Loeffler and Frosch.

39 The term "filterable virus" is now considered to be obsolete: Luria, S. E. *General virology.* New York, John Wiley & Sons, Inc., 1953, 427 pp. (p. 6).

ology of water, and several familiar standard methods (Alkaline methylene blue stain, fagella staining method, selective and enrichment techniques in examination of fecal material).[40]

Loeffler was honored during his lifetime by the conferment of numerous honorary degrees by universities and decorations by the governments of many countries. He was a Privy Councilor and a member of the German Imperial Council on Health. He served as Rector of the University of Greifswald from 1903 to 1907. In 1905 he received the rank of Generalarzt in the military, and in 1913 succeeded Gaffky as Director of the Institut für Infectionskrankheiten in Berlin. He served as Generalarzt and hygienist in World War I, but the strain was too great, and his health failed him in December 1914. After much suffering and an operation, he died on 9 April 1915. He is buried at Greifswald. Gaffky closes his tribute to Loeffler with these words: "His life was work and it has been excellent. He was a magnificent person and he will live on in his work.[41]

[40] Note 2.
[41] Gaffky (note 2)

Caricature of Doctor and Patient—After Molière

A Lithograph by Stop (1825-1899). New Haven, Yale Medical Library, Clements C. Fry Collection.

Louis Pierre Gabriel Bernard Morel-Retz, a portraitist, genre painter watercolorist, engraver, etcher, and caricaturist of the French School, devoted himself principally to caricature and holds a significant place among the humorists of the end of the Second Empire and of the Third Republic. Under the pseudonym of Stop he published frequently in *Le Journal Amusant, Charivari, L'Illustration, and Le Musée des Familles,* commenting in caricature upon the political scene in Europe and upon the social scene of French society.[1,2,6,7]

The medical profession here finds itself the object of Stop's humor as he draws from the theatrical past two characters from Molière's *Le Malade Imaginaire* (The Hypochondriac*-1673) to play this imaginary scene:

> M. Purgon (the doctor)—Well M. Argan, this little medicine, did it succeed, yes or no?
>
> M. Argan (the hypochondriac)—My God, my good M. Purgon, I am quite content with the result, now we have to wait for the effect . . .*

This double-talk, coupled with M. Purgon's seventeenth century medical garb and enema syringe, brings to mind Molière's ridicule of the physician. Molière was shocked by the state of medicine of his time—static and pedantic, a relic of the previous century. He attacked the façade of the foolish doctor, his incomprehensible Latin and Greek, his mule, his wig, his black robe and long pointed hat, his beard, and his deluded but often sincere belief in his ability to re-establish the balance of humors of the sick man's corrupt constitution. The playwright was protected from vengeful counterattack by a secret agreement with the young Louis XIV who said, in reference to Molière's comedies, that "Doctors lead often enough to crying that they should sometimes cause laughter."*[4] That Louis XIV was purged 2,000 times in 59 years speaks eloquently of the zeal with which the seventeenth century patient was supported in his battle against disease.[3] Molière ridiculed the foolish physician, but not the field of medicine, for he did not hesitate to include among his friends serious physicians such as Bernier, Liénard and Mauvillain.

This caricature reminds us of the humorous, but sobering image of the doctor, an image which once enjoyed even royal sanction. An anecdote is told by Grimarest:[5] Louis XIV is said to have asked Molière "You have a doctor [Mauvillain]; what does he do for you?" Molière replied "Sire, we chat together; he prescribes cures for me; I do not take them, and I recover."*

A. H. M.

* My translation.

1 Benezit, *Dict. des Peint., Sculp., Dessin., et Grav.* Paris, Lib. Gründ, Vol. VI, 1953.
2 Grand-Carteret, J., *Les Moeurs et la Caricature en France,* Paris, n.d.
3 Jouanny, R. in Molière, *Le Malade Imaginaire,* Paris, Librairie Hatier, n.d.
4 Raynaud, M., *Les Médecins aux Temps de Molière,* Paris, 1863, p. 415.
5 *Ibid.,* p. 424.
6 Thieme-Becker, *Künstlerlexikon,* Leipzig, 1930, Vol. XXV.
7 Vapereau, Gustav, *Dictionnaire Universel des Contemporains,* Paris, 1893.

– Eh bien, Mr Argan, cette petite médecine a t-elle réussi, oui ou non?
– Mon Dieu, mon bon Mr Purgon, je suis assez content du résultat, maintenant il faut attendre l'effet...

Notes and Events

Edited by Dorothy M. Schullian*

The Old Age Description in Ecclesiastes *and its Medical Interpretation by Johann Heinrich Michaelis*

The last chapter of *Ecclesiastes* contains a short, and at the same time very impressive, description of the diseases and incommodities of old age (chapter 12, vv.2-6). The first and seventh verses of the chapter do not contribute materially to the "medical" content but round out the passage, presenting a necessary and aesthetically adequate introduction and epilogue.

The modern reader is not inclined to a strictly verbal interpretation in terms of disturbed physiology. He would prefer to regard the passage, with its several symbols and allegories, as a time-honored, concise, and meaningful masterpiece of Biblical poetry. Medico-historical comments on it have, however, been numerous in both earlier and more recent times.[1] Philological as well as gerontological points have been discussed. Hyrtl,[2] for example, mentioned the now obsolete use of the term "silver thread" (*funis argenteus*) for spinal cord in mediaeval anatomical nomenclature.

A pronounced localistic approach to some of these verses and an attempt at strict anatomical identification is found in the *Biblia Hebraica* of 1720 which was edited by Johann Heinrich Michaelis.[3] Michaelis (1668-1738), theologian and Hebraist and professor of theology at the University of Halle, intended primarily to provide a correct Hebrew text based on nineteen printed editions and on five manuscripts preserved at Erfurt. His marginal Latin notes, printed in a very small font, constitute a concise running scientific apparatus. In this passage they are a source of interesting anatomical identification even though they are not accompanied by the detailed argumentation which the brevity of his remarks precluded. Most of these verses he interpreted in the same way as had earlier commentators, but verse 6 is explained in another way, perhaps under the influence of the newer cardiology. The verse has the following wording in the King James version:

> Or ever the silver cord be loosed, or the golden bowl be broken, or the pitcher be broken at the fountain, or the wheel broken at the cistern.

For Michaelis "the silver cord" refers to the noble thread of life, "the golden bowl" to the heart, "the pitcher . . . at the fountain" to the veins at the right ventricle of the heart (*sic*!), and "the wheel broken at the

* History of Science Collections, Cornell University Libraries, Ithaca, New York.

cistern" to the destruction of the pulse and abolition of the circulation of the blood.

It would seem that the commentator was induced to this trend of explanation by the rising interest in cardiological research which had been inaugurated a century before by William Harvey and had developed further in the lifetime of Michaelis. The first textbook in this field[4] had been published just five years before his edition of the Hebrew Bible. It is perhaps significant that his colleague at the University of Halle was Friedrich Hoffmann (1660-1742), who showed keen interest in heart diseases and spoke even of "impairment of the free passage of the blood through the coronary vessels."[5] The very terms "bowl" and "fountain," of course, abetted the analogy between a well of water distributed for preservation of life and the heart as a well of blood distributed through the vessels.

It appears very possible, therefore, that the increased study of the heart and the blood vessels at the beginning of the eighteenth century found an unexpected repercussion in the work of this theologian and Biblicist.

JOSHUA O. LEIBOWITZ

REFERENCES

1. SMITH, JOHN, *M.D., of Great St. Helen's* [Greek] King Solomon's portraiture of old age, London, By J. Hayes for S. Thomson, 1666 (266 p., entirely devoted to the author's interpretation of Chapter 12 of Ecclesiastes); Reinhard, Christian Tobias Ephraim. *Bibelkrankheiten welche im Alten Testamente vorkommen.* Frankfurth und Leipzig, 1767. 149 pp.; Mead, Richard. *Medicina sacra.* Londini, 1749; Friedreich, J. B. *Zur Bibel.* Nürnberg, 1848, 2 vols. (cf. pp. 1-28); Haupt, Paul. *The book of Ecclesiastes.* Baltimore, 1905; Holtzhammer, H. Réflections sur le sens biologique du chapitre douze de l'Ecclésiaste. *Revue de l'Histoire de la Médecine Hébraïque,* 1957, N. 36, pp. 77-86, N. 38, pp. 161-169.
2. HYRTL, JOSEPH. *Das Arabische und Hebräische in der Anatomie.* Wien, 1879.
3. Bible. Old Testament. [Hebrew] *sive Biblia Hebraica* ex aliquot manuscriptis et compluribus impressis codicibus . . . recensita. . . . Accedunt loca Scripturae parallela . . . brevesque adnotationes . . . cura ac studio J. H. Michaelis. Halle, 1720.
4. VIEUSSENS, RAYMOND. *Traité nouveau de la structure et des causes du mouvement naturel du coeur.* Toulouse, 1715.
5. HOFFMANN, FRIEDRICH. *Medicina rationalis systematica.* Frankfurt/Main, 1738, vol. 3, ch. 12, §12.

The Term "Doctor"

In American society, where titles of nobility have not been permitted, the term doctor has come to be adopted by an ever-increasing number of people as almost equivalent to a title. Physicians and surgeons, college professors, dentists, chiropractors, ministers, evangelists, and numerous others are called doctors; there are even doctors of corsetry. In the popular mind the term is probably most closely associated with the medical profession, and the proliferation of other people calling themselves doctors, whether or not holders of earned or honorary degrees, has caused considerable confusion; it has even led some physicians to suggest that other titles be utilized. Part of the difficulty comes from the term doctor itself.

The word is derived from the Latin *docere,* to teach, and it was first applied in the mediaeval university to the graduates of the higher faculties, particularly theology, but also medicine, civil and canon law. A man entitled to use the term was recognized as a learned man, skilled in a specific branch of knowledge in which he was competent to teach or to express an authoritative opinion. Not all the mediaeval universities which offered medicine, however, awarded doctorates in it. Medical graduates at Montpellier were referred to as masters in all the early statutes.[1] At Bologna the doctorate was awarded in medicine as in philosophy, law, astrology, logic, rhetoric, grammar, and surgery.[2] The statutes at Paris most often refer to medical graduates as masters, although the term doctor was also occasionally used.[3] Increasingly, however, the graduate in medicine at all universities came to be referred to as doctor, and both Oxford and Cambridge gave such a degree.[4]

From the mediaeval literature it seems apparent that the university-trained physician, the "doctor," was regarded as an especially learned man, more learned than his uneducated competitors such as the barbers or barber surgeons. Chaucer, in the *Prologue to the Canterbury Tales,* referred to just such a physician:

> With us ther was a DOCTOUR OF PHISYK,
> In al this world ne was ther noon him lyk
> To speke of phisik and of surgerye;
> For he was grounded in astronomye.
> . . . . .
> Wel knew he the old Esculapius,
> And Deiscorides, and eek Rufus,
> Old Ypocras, Haly, and Galien;
> Serapion, Razis, and Avicen;
> Averrois, Damascien, and Constantyn;
> Bernard, and Gatesden, and Gilbertyn.[5]

Chaucer seemingly implied that the doctor was just the person a sick man could rely upon, a much different type from the quack Roger Clerk who

1 See, for example, *Cartulaire de l'université de Montpellier* (Montpellier, Ricard Frères, 1890), *1,* No. 2, p. 182, and *passim.*

2 *Statuti delle università e dei collegi dello studio bolognese,* edited by Carlo Malagola (Bologna, Nicola Zanichelli, 1888), p. 257, rubric 48; p. 445, rubric 32; p. 498, rubric 1; and *passim.*

3 The term doctor was used at Paris in 1271 (see *Chartularium universitatis Parisiensis,* edited and annotated by H. Denifle and A. Chatelain [Paris, Delalain, 1888-1897], *1,* No. 434, p. 489), but the term master was most often used in the thirteenth and fourteenth centuries.

4 See my "Medical study at mediaeval Oxford," *Speculum,* 1961, *36,* 600-612, and also "The mediaeval medical school at Cambridge," *Mediaeval Studies,* 1962, *24,* 161-168.

5 Geoffrey Chaucer, *The Canterbury tales,* in *The complete works of Geoffrey Chaucer,* edited by Walter W. Skeat (2d ed., reprinted; Oxford, Clarendon Press, 1924), 4, prologue, p. 13.

in 1382 was brought to court for pretending to be a physician. Roger had attempted to cure a female patient by giving her an "old parchment, cut or scratched across," to wear around her neck. The woman did as she was instructed but unfortunately did not recover, and Roger was called upon to defend his treatment. Roger maintained that the cure he gave Johanna was a valid one since the parchment contained the words:

> Anima Christi, sanctifica me; corpus Christi, salva me;
> in insanguis Christi, nebria me;[6] cum bonus Christus tu, lava me.

When the court examined the parchment, it was found that none of these words were written upon it, and that in fact Roger was an illiterate "infidel," ignorant of the art of physic. The court held that Roger's prescription was as effective as a straw beneath the foot, and sentenced him to be led through the center of London with trumpets and pipes blowing to attract attention. Roger was to ride bareback on a horse with his parchment hung around his neck, together with a whetstone for his lies and two urinals, one in front and one in back, as a sign of his disgrace.[7]

It was to distinguish themselves from such charlatans that the university-trained physicians emphasized the fact that they were doctors, and this emphasis had, by the end of the sixteenth century, made doctor almost a generic term for physician. Part of the explanation for this phenomenon is that most words implying superior status or birth tend to become words of praise, like chivalrous, courteous, frank, generous, gentle, liberal, and noble, whereas words implying inferior status or qualifications, like ignoble, villain, and vulgar, tend to express disapproval.[8] "Doctor" obviously belonged to the first classification, and its adoption was probably pushed consciously or unconsciously by the medical profession itself. The increased association of the word doctor with medicine in England was assisted by the decline of the higher faculties at both Oxford and Cambridge in the sixteenth and seventeenth centuries.[9] This decline led to a decreasing output of doctorates in all fields and seemingly allowed the medical practitioner to assume more easily the title doctor. By the eighteenth century a wide variety of medical practitioners came to be called doctors; Defoe in 1725 implied that doctor was a common term for surgeons, at least while at sea.[10] From its widespread identification with medicine, the term doctor also

[6] This should probably read "sanguis Christi, inebria me." With this substitution made, the inscription is translated "Soul of Christ, sanctify me; body of Christ, save me; blood of Christ, drench me; as thou art good Christ, wash me."

[7] Henry Thomas Riley, *Memorials of London and London life in the XIIIth, XIVth, and XVth centuries* (London, Longmans, Green and Co., 1868), 2, 464-466.

[8] For amplification of this see Clive Staples Lewis, *Studies in words* (Cambridge, University Press, 1960), p. 21.

[9] Mark H. Curtis, *Oxford and Cambridge in transition, 1558-1642* (Oxford, Clarendon Press, 1959), pp. 149 ff.

[10] Daniel Defoe, *New voyage around the world,* in *The novels and miscellaneous works of Daniel Defoe* (London, Henry G. Bohn, 1856), 6, p. 329.

came to be applied to other things which gave or preserved health and in the seventeenth century there were references to Doctor Diet and Doctor Quiet.[11] The next step in the evolution was to attach the word to appliances which were used for curing or removing defects of any kind. In the eighteenth century, in fact, a whole host of mechanical devices was nicknamed doctor: the textile industry had color-doctors, lint-doctors, and cleaning-doctors, printing had steel-doctors. Methods of making liquor, wine, food, or even medicine better or more palatable came to be called doctoring, e.g., doctoring a weak wine with a better one.

It is clear, then, that by common usage, which seemingly had some logic on its side, the term doctor, which had originally meant teacher, soon became a university degree as well as a description of a learned man, especially one who had graduated from the higher faculties. The most respected physicians were doctors, but in English the term came to be applied gradually to almost all medical practitioners, regardless of their educational qualifications. At the same time, none of the other groups, especially ministers and teachers who had earned doctorates, quite gave up the use of the term doctor; as a result, when graduate education began to proliferate, as it did in the twentieth century, there was a sudden increase in doctorates. Adding to the confusion was the continued use of the term for one who fixes or modifies, so that a mechanic who "doctors" an engine can, at least in his own advertisements, be called a car doctor, and one who "doctors" a figure can receive from a school of corsetry the degree of doctor of corsetry. There can on this principle be also doctors of cosmetology. The problem comes down to the definition of the word doctor, and here there is no easy answer since the word implies so many things. Even though words take on new meanings they do not necessarily lose their old ones, and the earliest sense of a word often continues to flourish.[12] The Roman Catholic Church has for centuries used the term Doctor of the Church of especially learned fathers and teachers, and this continued use is perhaps closer to the original meaning of the word than any of the changes which have occurred; it is, however, no longer the dominant meaning. It seems safe to say that the word doctor no longer has any exclusive meaning, and that any person who wants to use the term can define it to suit his own needs.

VERN L. BULLOUGH

Sir Thomas Crawford and "Physical Deterioration" in 1887

At the Dublin meeting of the British Medical Association in 1887 Sir Thomas Crawford, the Director-General of the Army Medical Department, delivered an address on "Devolution and Evolution." Cautioning

[11] James Howell, Θηρολογία· *The parly of beasts* (London, Printed by W. Wilson for William Palmer, 1660), p. 23. There is a copy of the original edition in the William Andrews Clark Memorial Library, University of California at Los Angeles.

[12] Lewis, *op. cit.*, pp. 8-12.

his listeners that "the now familiar doctrine of evolution has thrown so much light on the hitherto ill-understood laws of development, that we are prone to forget the process of *devolution* or degradation," he suggested that, in fact, the "lower orders" in England, rather than improving, were physically deteriorating.[1]

The basis of Crawford's alarming (and rather hasty) conclusion was a comparison of medical rejections of recruits for the Army for the years 1860-64 and 1882-86. During the former period (in which, Crawford argued, the criteria used by the medical examiners were actually more stringent) 371.67 per 1000 of recruits were rejected on medical grounds; for the years 1882-86, the figure was a noticeably higher 415.58 per 1000.[2] The inference was that "the lower classes, from whom the recruits for the army are chiefly taken, are of an inferior physique now to what they were twenty-five years ago," a development which Crawford ascribed to the conditions of "filth" and overcrowding in the teeming cities of industrial England.[3] In the best tradition of the English "sanitarians" Crawford was convinced that the principal sources of this deterioration were social and could be remedied by appropriate preventive measures, several of which he suggested.

But Crawford's remarks are of interest primarily because they anticipated by more than a decade the better-known and more influential conclusions—also reached on the basis of Army recruit rejections—made in 1901-03 by Seebohm Rowntree in his social survey of York and, independently, by Major-General Sir Frederick Maurice in two articles for the *Contemporary Review*.[4] Rowntree and Maurice convinced few that England's lower classes were physically deteriorating, but they succeeded in drawing attention to the question of the physical well-being of the masses. The effect was the work of the important Interdepartmental Committee on Physical Deterioration of 1903 which, in turn, led to some of the social reforms of the Edwardian period.[5]

Crawford, speaking before the Boer War and before the intensification of international rivalries in which the war was a factor, was less fortunate. Alarming as his words would seem, they attracted little attention. In 1887 the Victorian faith in progress, though shaken by the "Great Depression," was still the philosophy in office, and Britons still rested content behind the deceptive security of "Splendid Isolation." Ironically, to at

1 *Brit. med. J.*, 1887, 2, 337.
2 *Ibid.*
3 *Ibid.*, 338.
4 B. Seebohm Rowntree, *Poverty: A study of town life* (London, 1901), pp. 216-20; "Miles" [Maurice], "Where to get men," *Contemporary Rev.*, 1902, *81*, 78-86; Maurice, "National Health: A Soldier's Study," 1903, *83*, 41-56.
5 See the Inter-Departmental Committee on Physical Deterioration, *Report*, Cd. 2175, (Parliamentary Papers, 1904), pp. 85-92 for the Committee's recommendations. The School Meals' Service, the School Medical Service, and lesser measures relating to infants and children were the main results.

least one observer Crawford's remarks were not only alarming, but were a positive source for optimism. In the *Fortnightly Review* of October, 1887, the surgeon Charles Roberts summarized Crawford's data and concluded that "we have little cause for anxiety, but rather good grounds for congratulating ourselves on the future of our national physique."[6]

Such comfortable self-congratulations would soon disappear, but Sir Thomas Crawford did not live to see the day. He died in 1895,[7] another of history's prophets without honor.

JAMES E. O'NEILL

Historical Gleanings

This section carried in the Journal for 1960, *15*, 305 a notice of Augusto Beccaria's first study on early Latin translations of Hippocrates and Galen. The second, bearing the same title "Sulle tracce di un antico canone latino di Ippocrate e di Galeno," appeared in the same organ, *Italia medioevale e umanistica*, 1961, *4*, 1-75. It is devoted to the *Aphorisms* and commentary on them in manuscripts dating from the eighth to the twelfth century. Six plates illustrate the learned discussion.

Medical historians have learned that they must be familiar for the ancient period with articles published in the various journals of classical philology. To *Hermes* (1962, *90*, 385-401), for example, Markwart Michler has contributed a scholarly article entitled "Die praktische Bedeutung des normativen Physis-Begriffes in der hippokratischen Schrift De fracturis–De articulis."

In *Plateau*, 1963, *35*, 69-74 Saul Jarcho, Norman Simon, and Edgar M. Bick discuss "A Fused Hip from Wupatki." The Wupatki Pueblo in Arizona is believed to have been occupied between 1050 and 1250 A.D. approximately. This specimen, now in the Museum of Northern Arizona, formed part of a composite burial. The fusion was probably due to nontuberculous infection. *Plateau* is published by the Northern Arizona Society of Science and Art, Museum of Northern Arizona, Flagstaff. Medical history in early America was investigated by Dr. Jarcho also in the Fielding H. Garrison Lecture, "Some Observations on Disease in Prehistoric North America," which he presented before the American Association for the History of Medicine on 3 May in Boston.

Readers are reminded that the *Hebrew Medical Journal*, a semi-annual publication, sometimes carries articles of historical interest. In volume 2 for 1962, for example, Leon Nemoy of Yale University edits on pages 239-213, with introduction, Arabic text, and English translation, the treatise

[6] Charles Roberts, "The physical condition of the masses," *Fortnightly Rev.*, 1887, *n.s. 42*, 490.

[7] See his obituaries: *Brit. med. J.*, 1895, 2, 1005; *Lancet*, 1895, 2, 1013.

of Ibn Kammunah on the immortality of the soul. This remarkable but almost forgotten Jewish physician was born in or near Baghdad early in the thirteenth century. The treatise is known in one manuscript only, which is preserved in the Yale University Library. Dr. Nemoy had published a facsimile of it in 1944 and an English translation in 1958; this is the first edition in clear, fully dotted type of the Arabic text. The Hebrew version of Dr. Nemoy's introduction is carried on pages 131-136.

The Black Death of 1348 and recent scholarship on it and on its economic effects are examined by Élisabeth Carpentier in her article "Autour de la peste noire: Famines et épidémies dans l'histoire du XIV^e^ siècle" (*Annales,* Economies, Sociétés, Civilisations, 1962, *17,* 1062-1092).

The index of Pearl Kibre's *Scholarly Privileges in the Middle Ages* (Cambridge, Mass., The Mediaeval Academy of America, 1962) will give access to many nuggets of information on anatomy, barber-surgeons, medicine, and pestilence at the universities of Bologna, Padua, Paris, and Oxford.

Vern L. Bullough continues his investigations of medical schools in the Middle Ages with his article "The Mediaeval Medical School at Cambridge" in *Mediaeval Studies,* 1962, *24,* 161-168. Basing his work on printed sources, he finds that the school "was no match for those on the continent, while in England it lagged behind Oxford."

Lists of books in private libraries will often reveal much concerning the person who gathered them and the period in which they were gathered. In *Gutenberg Jahrbuch* for 1961, pages 93-100, Carlo De Frede provides inventories of the libraries of four Neapolitan physicians—Gabriele Nicia, who listed some of his books (manuscripts) in his will dated 20 May 1460; Ladislao De Pisinis, of whose books there is a record for the year 1477; Antonio Solimene, whose will was read 9 November 1486; and Antonio Damiani, the inventory of whose possessions was read 19 October 1499.

In *Gutenberg Jahrbuch* for 1960, pages 141-143, Wytze Gerbens Hellinga and Lotte Querido discussed the question "Was the Bagford-Fragment of Kamitus Tractatus de regimine pestilentico printed by Claes or by Gheraert Leeu?" For this they had consulted in proof Part IX of the *Catalogue of Books Printed in the XVth Century now in the British Museum,* which appeared in 1962 and which on the basis of their note changed its ascription (pages 193-194, IA 49807) from Claes to Gerard Leeu.

The illustrations in the editions of the *Fasciculus medicinae,* published first on 26 July 1491, are examined by Lamberto Donati in *Gutenberg Jahrbuch* for 1961, pages 71-76.

Theodore Sizer describes in the *Yale University Library Gazette,* 1962, *36,* 119-121 the two cartouches which he fashioned for the Historical Library of the Yale University School of Medicine. The one hanging over the fireplace portrays the arms of Andreas Vesalius—three running weasels. The other, hanging at the opposite end of the Library, represents the personal "badge" of William Harvey—the caduceus in the form of a burning candle. John F. Fulton posed for the hand which holds the candle.

This section noted in the Journal, 1961, *16,* 312 the activity of the printer Thomas Vautrollier, who in 1583 included among the books which issued from his press *The Methode of Phisicke,* by Philip Barrough. Colin Clair contributed an article on Vautrollier to the *Gutenberg Jahrbuch* for 1960, pages 223-228.

In 1910 Hugo Matthiessen (1881-1957), Inspector of the Danish National Museum, published a book on hangmen and gallows birds entitled *Bøddel og Galgefugl.* One chapter from it, "Skarpretter som Læge," was reprinted in attractive format in 1962 (Copenhagen, Mölnlycke A/S) under the editorship of Dr. E. Snorrason, Secretary of the Danish Society for Medical History. It discusses Danish, Norwegian, and German hangmen-physicians. Dr. Snorrason supplied a preface and a bibliography on hangmen as physicians; the illustrations in the 34-page booklet include a reproduction of Gerard David's "Flaying of Sisamnes" (1498).

Medico-historical activities in Scandinavia are further illustrated by *Medicinhistorisk Årsbok* for 1962. This is the yearbook of the Medical-Historical Museum in Stockholm; it is edited by Wolfram Kock with the co-operation of Egill Snorrason representing the Danish Society for Medical History, Bernhard Getz the Norwegian Society for Medical History, Matti Haltia the Amici Historiae Medicinae at Helsingfors, and Jón Steffensen his Icelandic colleagues, not organized in a society, who work in the history of medicine. These five historians report on activities in their respective countries. Other articles are contributed by Carl Aaberg on surgeons and physicians in Denmark during the first half of the eighteenth century, Telemak Fredbärj on Swedish archiaters, Robin Fåhræus on Jean Dominique Larrey, Sven Hellerström on the centenary of Sweden's first professorship in syphilology, Folke Henschen on Swedenborg's cranium, Arvid Huss (an architect) on Magnus Huss, Jakob Jakobsen on Claudius Julius Boye, Carl Kling on the last hundred years of polio research, Wolfram Kock on the decennial of the organization of his Museum's "Friends," on medical historians in Poland, and on Swedish medical men as famous writers, Laurits Lauridsen on vagitus uterinus, Werner Möller on Johan von Hoorn's bibliography, Vilhelm Møller-Christensen on skeletal findings in a mediaeval church of Roskilde, Ole Secher and three collaborators on the Møllgaard positive-pressure anaesthetic apparatus, Jón Steffensen on

Eir, goddess of medicine, Hans Jacob Ustvedt on Peter F. Holst, and Karin Östberg on healing in ancient India. As usual, the articles are for the most part reprinted from various journals and are summarized in English.

Opinions on the medical value of music in the Renaissance, those in Milton's *L'Allegro* included, are examined by Gretchen Ludke Finney in her article "Music, Mirth, and Galenic Tradition in England" (*Reason and the Imagination,* Studies in the History of Ideas, 1600-1800, edited by J. A. Mazzeo, New York, 1962, pages 143-154).

The interest of Johannes Steudel in the history of mineral baths is displayed in his attractive illustrated article "Aus der Vergangenheit deutscher Bäder (*Heilbad und Kurort,* 1962, Nr.10, 6 p.) and in the chapter "Geschichte der Bäder- und Klimaheilkunde" which comprises eighteen pages in the recently issued *Handbuch der Bäder- und Klimaheilkunde,* edited by W. Amelung and A. Evers (Stuttgart, Friedrich-Karl Schattauer-Verlag). In *Gesnerus,* 1962, *19,* 75-82 Dr. Steudel published an article on the physical therapy of Herodotus, a member of the Pneumatic School who was active in Rome at the end of the first century A.D.

In 1740 Johann Christian Wolf listed among authors who had written on the invention of printing the anatomist Thomas Bartholin (1616-1680). Rudolf Hirsch examines in *Gutenberg Jahrbuch* for 1960, pages 308-309, Bartholin's statements on this matter in his work *De libris legendis,* Chapter IV.

George S. T. Cavanagh contributes a note to *Books and Libraries at the University of Kansas* (1962, 2, 20) concerning a medical advertisement issued by J. Russel, "physician and oculist," perhaps about 1680. It sings the praises of Russel's "elixerated spirit of scurvy-grass, both plain and purging." Two copies of it, rescued from a binding, are preserved in the Clendening Medical Library.

Volume 5 (1 July 1753-31 March 1755) of *The Papers of Benjamin Franklin,* edited by Leonard W. Labaree and Whitfield J. Bell, Jr. (New Haven, Yale University Press, 1962) contains on pages 283-330 "Some Account of the Pennsylvania Hospital," which was printed in 1500 copies in the spring of 1754. It includes the principal documents relating to the hospital to 1754 and constituted a report of the stewardship of its managers to that date, demonstrating thereby the reasons for continued support on the part of Assembly and public.

The twelfth-century illuminated psalter bequeathed by William Hunter in 1783 and proudly preserved in the Hunterian Museum of the University of Glasgow (John Young and P. Henderson Aitken, *A Catalogue of the Manuscripts in the Library of the Hunterian Museum . . . ,* Glasgow,

1908, no. 229) is discussed by T. S. R. Boase in *The York Psalter* (London, Faber and Faber, 1962). Dr. Hunter's manuscripts in general reveal his interest in heraldry, as David Reid of Robertland shows in his article "Notes on the Heraldry of the Hunterian Manuscripts in the University of Glasgow" (*The Bibliotheck*, 1962, *3*, no. 5, 151-165). The list of forty-nine manuscripts which is provided was prepared for an exhibition of heraldic illuminations and bindings at the University of Glasgow. It is prefaced by the narration of Hunter's matriculation of his own arms in the Lyon Office in Edinburgh on 28 January 1752. The original document is preserved in the Royal College of Surgeons of England.

In the *Historical Journal*, 1962, *5*, 1-18 R. J. Lambert discusses "A Victorian National Health Service: State Vaccination 1855-71." He does not find the vaccination system "in the extent of its intrusiveness, the modernity of its standards, in its origins and processes, something altogether anomalous in mid-Victorian government."

Readers are reminded that the journal *Acta medicae historiae Patavina*, edited by Loris Premuda, continues to issue from the Istituto di Storia della Medicina of the University of Padua. Volume VII, for the academic year 1960-61, carries a prefatory note dated 30 December 1961 and appeared in 1962.

In the British Association Volume for 1962, *Manchester and its Region*, William Brockbank gives on pages 198-214 a clear and satisfying survey of that city's place in the history of medicine. In his interest in this field he follows the tradition set by his father Edward Mansfield Brockbank (d. 2 January 1959), who was president of the Manchester Medical Society in 1923-1924 and chairman of its library committee over the long period 1906-1934.

Emphasis on the history of medicine increases both in academic circles and beyond the campus. In February and March Benjamin Spector gave once a week at 5 p.m. for the Department of Bioanatomy at Tufts University School of Medicine a seminar in which he suggested to the students the link of the past to the present by the actual wording of his topics, e.g., "From the Legalism of Jeremy Bentham to the Development of Preventive Medicine." At Washington University School of Medicine during the same period Estelle Brodman talked to second-year students on such highlights as William Beaumont, art and medicine, and mediaeval epidemics; on 7 June the scientific papers, correspondence, and memorabilia of Dr. Joseph Erlanger, emeritus professor of physiology and Nobel prize winner in 1944, were presented to the library of this institution. In Los Angeles a Society for the History of Medicine was organized at Cedars of Lebanon Hospital and dinner meetings were held each quarter, beginning

21 June 1962; the speakers included Leon Morgenstern, Jacob Zeitlin, and Elmer Belt. The society is sponsored by the hospital's medical library, whose librarian is Philip Alexander. In San Francisco at the University of California Medical Center exhibitions were mounted in the period December 1962-May 1963 depicting the physician as poet, representative medical books of famous printers, and the history of Oriental medicine; in addition, the death of Albert Einstein in April 1955 was commemorated, and the intellectual steps by which Gordon A. Alles (1901-1963) was led to demonstrate the biological activity of the amphetamines were illustrated.

The Department of the History of Medicine at Osmania Medical College (Journal, 1962, *17,* 313), whose director is Dr. D. V. Subba Reddy, has initiated a quarterly *Bulletin* which will incorporate studies on the source material collected and the research work prosecuted in the department. Subscriptions ($4 per year) may be sent to the director at Nizam Bagh, Dewan Devdi, Hyderabab, Andhra Pradesh, India. The Journal extends its good wishes to this new publication, which will also carry notices of medico-historical activities in India and elsewhere.

Dr. Morris Fishbein delivered on 10 April at the University of Kansas Medical Center the eleventh Clendening Lecture on the History and Philosophy of Medicine. His subject was "The Evolution of Medical Journalism."

Early manifestations of bibliomania in Harvey Cushing, Arnold C. Klebs, and John F. Fulton are discussed by Elizabeth H. Thomson in the *Journal of the Albert Einstein Medical Center,* 1962, *10,* 98-107.

The Journal records with sorrow the death on 22 February 1963 of Rachel McMasters Miller Hunt, good friend of Yale and lover of the beautiful in nature and in books. She lived to see dedicated on 10 October 1961 The Hunt Library which she and her husband, Roy Arthur Hunt, had donated to the Carnegie Institute of Technology in Pittsburgh, and to see installed in its penthouse the magnificent botanical library which she had assembled over many years of patient and devoted effort. Volume I (Printed Books 1477-1700, with several manuscripts of the 12th, 15th, 16th, & 17th centuries) of the catalogue of that library, compiled by Jane Quinby, was privately published in 1958, Volume II (Printed Books 1701-1800), compiled by Allan Stevenson, in 1961.

George Bion Denton (1884-1963) died suddenly on 9 March. He had served as Research Consultant to the American Dental Association, which published in 1958 his book on dental nomenclature, *The Vocabulary of Dentistry and Oral Science,* and he had taught for many years at the Northwestern University Dental School. He was active in the American Academy of the History of Dentistry and editor of its official organ, the

Bulletin of the History of Dentistry. He held the Ph.D. degree from the University of Michigan (1916).

The Journal must also announce to its readers the death, on 17 March, of Archibald L. Goodall, M.D., D.H.P., F.R.C.S. Ed., F.R.F.P.S. Glas. Dr. Goodall was Hon. Lecturer in Surgery, University of Glasgow, and Hon. Librarian, Royal Faculty of Physicians and Surgeons, Glasgow. He contributed to the January issue of the Journal, with Thomas Gibson, an article on Robert Watt as physician and bibliographer.

A first Mexican colloquium on the history of science will be held in Mexico City 2-7 September 1963. It will be concerned with the history of the exact, physical, and natural sciences in Latin America from their beginnings through the nineteenth century.

A report was carried in the Journal, 1961, *16*, 426 on the celebration in Padua 29 September–1 October 1961 of the third centenary of the birth of Antonio Vallisneri. The celebration was sponsored by the University of Padua and the Accademia Patavina di Scienze, Lettere ed Arti, whose president at that time was Umberto D'Ancona of the Istituto di Zoologia of the university. The proceedings of the celebration were promptly issued in 1962 by the academy in a volume of 317 pages entitled *Il metodo sperimentale in biologia da Vallisneri ad oggi*. Papers by the American and British participants Howard B. Adelmann, Paul Weiss, A. C. Crombie, A. Dickson Wright, and J. Z. Young are included, together with Cornell University's official greetings. Professor D'Ancona is to be congratulated on both the celebration itself and the volume which publishes its contributions to scholarship.

Book Reviews

A. R. Hall and Marie Boas Hall. *Unpublished Scientific Papers of Isaac Newton. A Selection from the Portsmouth Collection in the University Library, Cambridge.* New York, Cambridge University Press, 1962. xx, 415 pp., 5 plates. $11.00.

Reviewed by Derek T. Whiteside, *D.S.I.R. Research Fellow, Whipple Science Museum, Cambridge, England.*

The dust jacket's claim that "this selection represents the first new material, apart from the *Correspondence*, to be published for over one hundred years" is not quite accurate, yet sufficiently so to make the appearance of this score of "unpublished papers" an exciting prospect. The Newtonian scholar is warmed in anticipation by the promise of new technical material, the non-specialist by the editors' already manifest culture and intelligence, the non-Latinist by the English renderings (where necessary) of Newton's originals. And when the book is read the two latter will, I believe, be reasonably pleased if the first disappointed.

The manuscripts which the Halls now reproduce (several, in fact, not for the first time) are for convenience grouped in six sections: *Mathematics, Mechanics, Theory of Matter, Manuscripts related to the Principia, Education,* and *Notes.* As the general preface makes clear, their primary interest has been and remains Newton's ideas on the nature of matter, and their development of this theme (which crosses several of their self-imposed boundaries) is the best part of the book. The new findings which are mined from the early *De Gravitatione et aequipondio fluidorum* (II, 1) and the maturer *De Aere et Aethere* (III), together with Newton's discarded preface/conclusion to the first edition (1687) of his *Principia* and a first version of the famous *Scholium Generale* appended to the second (1713), are collected in a persuasive, enjoyable essay which introduces *De Aere.* There the editors bring out the crucial role of Newton's thoughts on microcosmic corpuscular forces (such as capillarity, surface tension, and particle cohesion) in the formation of his general philosophy of nature, making sense of a jigsaw of ideas thrown out in his published preface to *Principia* and the later queries of *Opticks.* The knotty problem, in particular, of the existence and operating range of a pervading aether and whether it is necessary for the action of these small-scale forces is well discussed, and we may no longer deny the continuity over Newton's life of his speculations thereon from their youthful origin in reaction against Descartes' mechanical philosophy to his final views in old age.

Elsewhere the Halls present several versions of Newton's researches into the theory of planetary motion (one intended as an elementary account in deference to Locke's scientific inexperience), various mathematical pieces (the most important of which is a text, composed in October 1666, where Newton has gathered his early ideas on fluxions), some popularized accounts of current scientific fields, a suggestion for reforming university education and, last but in no way least, a highly interesting set of his notes on Hooke's *Micrographia*. Here unfortunately the editors' discussion is rather slight and their treatment of the mathematical papers—which occupy a surprising amount of space for a subordinate theme—particularly confused. (Surprisingly too, the Halls seem ignorant of Newton's Waste Book, arguably the most important single mathematical item in the whole Collection.)

This volume's appearance and readability should assure itself a wide circulation: for that the Cambridge Press deserves no less credit than the editors. As a plain text—and, of course, it is much more than that—it reproduces many valuable Newtonian pieces which have hitherto had a tightly restricted circulation in handwritten and photostatic copy and which must now become basic to future Newtonian criticism. For that we may forgive it its mistakes. However, if it should ever be reprinted, may I advise above all that the mathematical portion be thoroughly revised and the present unsatisfactory arrangement of translations many pages after the corresponding Latin text suitably amended?

W. A. Smeaton. *Fourcroy: Chemist and Revolutionary 1755-1809*. Cambridge, England, W. Heffer and Sons Ltd., 1962. xxi, 288 pp., 7 illus. 40s. $6.00.

Albert B. Costa. *Michel Eugene Chevreul, Pioneer of Organic Chemistry*. Madison, The State Historical Society of Wisconsin, 1962. 116 pp. $3.50.

Reviewed by George M. Fleck, *Assistant Professor, Department of Chemistry, Smith College, Northampton, Massachusetts.*

Nineteenth-century organic chemistry owed much to Antoine Lavoisier. His interpretation of the role of oxygen in combustion gave his contemporaries a framework for the discussion and investigation of compounds such as alcohols, ethers, esters, and carboxylic acids. He introduced chemists to the essential tools of quantitative analysis. Lavoisier's influence can be seen vividly in the work of Antoine François de Fourcroy (1755-1809) and Michel Eugene Chevreul (1786-1889).

Fourcroy was one of the first chemists to apply quantitative methods to the analysis of naturally occurring organic materials. As a lecturer and writer, he helped introduce Lavoisier's antiphlogistic theories. During

the French Revolution he was active not only in various revolutionary movements but also in assuring that such institutions as the scientific societies and the universities should survive the Revolution.

As one of some 400 members of the Third Estate meeting in the Spring of 1789, Fourcroy began a political career which was to be interrupted only occasionally during the remainder of his life. He became a member of the Convention in 1793 and, after the fall of Robespierre, was elected to the Committee of Public Safety.

Smeaton presents carefully documented arguments to clear Fourcroy's record of implication in the purges, the suppression of the learned societies and the execution of Lavoisier. The Revolution was not the time to record one's opposition to the Committee of Public Safety. Smeaton has therefore had to piece together Fourcroy's role with care and some imagination. He emerges as a courageous and principled, but also cautious politician who survived the Revolution to become a Councillor of State and Count of the Empire under Napoleon.

Fourcroy's experimental investigations included analysis of minerals, alloys and mineral waters, determination of the composition of water, and a study of the chemistry of mercury. It was in organic chemistry, however, that he made his most striking contributions. Fourcroy often in collaboration with N. L. Vauquelin performed extensive analysis of animal and plant substances from both healthy and diseased organisms. Smeaton gives an interesting case history of Fourcroy's gradual acceptance of Lavoisier's theories regarding combustion.

The discussion of chemical investigations would have been improved had modern chemical nomenclature been employed consistently in the text. The extensive chemical footnotes are helpful.

Chevreul, throughout his life an active experimental scientist, was associated with the *Musée Nationale d'Histoire Naturelle* for nearly 90 years and was a member of the *Academie des Sciences* for 63 years. His contributions to science were many and varied. After a brief biographical essay, Costa concentrates on but one aspect of this career, the elucidation of the nature of naturally occurring fats. Chevreul separated physically distinguishable fats from animal fat, examined their saponification products, isolated glycerin and several fatty acids, and made elemental analyses of the composition of each substance separated. He showed that fats are mixtures of but a few compounds each having definite composition.

Chevreul's research laid an important part of the foundation for the structural organic chemistry of functional groups which developed in the last half of the nineteenth century.

This book is an enjoyable discussion of significant investigations in organic chemistry. It is unfortunate that it was not given a format more attractive than the photo-offset reproduction of the original typescript.

JOHN L. THORNTON and R. I. J. TULLY. *Scientific Books, Libraries and Collectors,* 2d., rev. ed. London, The Library Association, 1962. xiii, 406 pp., 16 illus. $10.05.

Reviewed by COSMO A. GORDON, *The Old Manse, Insch, Aberdeenshire, Scotland.*

THIS useful book comes now in its second edition (third printing), enlarged to the extent of one fifth part of the whole. Though primarily a work of reference, the text remains so readable that the enquirer is apt to be carried on beyond the information he seeks: we remark this with no intention of dispraise.

The most notable additions in the first part of the book are those concerning the later work on Galen, on unexamined Arabic manuscripts (an inviting object for research), on the first Chinese printing, and on the riches of the Wellcome Historical Medical Library. In the chapter on the seventeenth century, the notice of Robert Hooke has been greatly extended in reliance on a revaluation of his work by Sir Geoffrey Keynes (Bibliography of Dr. Robert Hooke, 1960).

The whole eighteenth century scene has been worked over; one notes extensions of the articles on Priestley and Lavoisier and the chance discovery at the Public Library of Worcester, Mass., of much manuscript material on anatomy by that most English of artists, George Stubbs.

The account of Charles Darwin has been carefully revised and brought up to date with footnotes recording the considerable literature which has appeared since the original appearance of this book in 1954.

Misprints and minor errors in the first edition have mostly been corrected; a few remain, not of great consequence. Roger Bacon was born in Somerset, not Suffolk (p. 32); on p. 42 the name of the editor of Apuleius Platonicus, Joh. Phil. de Lignamine, appears as the title of a book. On p. 60 the first name of *Gerolamo* Cardan is still mistaken. These are trivial matters. To find important names which should have been included is not easy. Two come to mind; Luca Pacioli, (?-1514) an outstanding mathematician and incidentally the first to print (1494) a text on accounting, a subject which now has full academic recognition, though it is not included in the book under review. Another name we miss is that of Sir John Herschel, overshadowed by his more famous father, but important in his own right for his astronomical work in the Southern hemisphere. John F. W. Herschel's small book *On the Study of Natural Philosophy* (1830) certainly influenced the young Darwin.

It is probable that the historical section of the work under review will be more consulted than its survey of present-day bibliographical resources. Chap. IX, Scientific Bibliography and Bibliographers, has been much extended, but specialists in any subject are likely to notice the

omission of what may seem essential titles. Thus, in the only section which we have been able to check, Beilstein's *Handbuch der organischen Chemie,* now continuously supplemented for more than eighty years and an essential bibliographical tool, is not mentioned. Among more recent publications, the *Abstracts* issued by the Commonwealth Agricultural Bureaux on Plant Breeding, Herbage, Field Crops, etc., might well have been included. Taking a broader view, the *Referativnyĭ Zhurnal* has provided for the last six years a comprehensive abstracting service over several fields of science, and a future edition of Thornton and Tully will have to pay more attention to Chinese and Japanese literature.

The authors draw attention (p. 247) to the disquieting situation disclosed in Chap. VIII on The Growth of Scientific Periodical Literature. Their reflections on this justifiably occupy far more space in this edition as the tendency increases for researchers to rush into print with work whose originality has not been rigorously checked. Publishers find profit in promoting new journals, which begin well but deteriorate rapidly; stricter criteria could be applied in accepting papers for publication and the eminent, but non-functional, "editors" of commercially published periodicals should take more care of the way in which their names are being used! Universities and research institutions themselves are to blame where they judge the work of students or departments by the extent of their literary output or there is undue pressure to justify the use of grants.

All this is no doubt realised by those most concerned and there is no obvious escape from a situation which has become intolerable. Students should be made aware of it by such clear statements as this chapter holds; they can only hope to succeed in producing work that is worthwhile by constant vigilance directed by a flair for deciding what is relevant to their enquiries: time wasted on the exploration of ground already covered could be profitably spent on mastering one or more foreign languages.

HARVEY CUSHING. *A Bio-Bibliography of Andreas Vesalius.* 2d. ed. Hamden, Connecticut, Archon Books, 1962. xxxviii, 264 pp. illus. $22.50.

Reviewed by C. D. O'MALLEY, *Professor of Medical History, Department of Anatomy, University of California Medical Center, Los Angeles.*

THIS work first appeared exactly twenty years ago in an edition of modest size which was soon exhausted, and since the demand for the book remained constant, it was not long before copies could be obtained only at a considerable premium over the original publisher's price. The second edition, therefore, supplies a long-felt need and, as well, includes such items of Vesalius's bibliography as had been overlooked or have appeared since the earlier publication, and the large number of Vesaliana, or articles concerned with Vesalius, that have been published during the intervening years. This

has been accomplished by a reprint of the first edition in photographic facsimile with the supplementary matter added in letterpress. The book has been strongly if not elegantly bound, in contrast to the more handsome but also more flimsy binding of the earlier edition.

The editor of this new edition, Miss Madeline E. Stanton, Librarian of the Historical Library, Yale Medical Library, a recognized center of Vesalian interest and research, has turned up an imposing number of additions to Vesalius's bibliography. Perhaps the most important is Chrestien Wechel's plagiarism of the *Tabulae anatomicae* (II.-23a), a copy of which was discovered several years ago in Stockholm. This find, as indicated by Miss Stanton, has conclusively answered Dr. Cushing's query regarding the identity of "the Paris offender" in the first edition.

The list of Vesaliana has been greatly extended, the old and the new titles helpfully combined in a single, alphabetized list. In the first edition there were two lists of Vesaliana, the second of them a last-minute supplement separately alphabetized and intended to contain articles published in conjunction with the Vesalian celebration of 1943, but in fact a very sketchy supplement which included and excluded titles on no very rational basis.

There is a leaf of corrigenda calling attention to certain lapses in the first edition, and, finally, a new index of names includes both those mentioned in the first edition and in the supplementary material.

It is good to have the bibliography once more available, and in extended form, and all those who have an interest in Vesalius and his period can only be grateful to Miss Stanton for a job well done.

CHARLES SINGER and E. ASHWORTH UNDERWOOD. *A Short History of Medicine.* 2d. ed. New York, Oxford University Press, 1962. 854 pp., illus. $10.00.

Reviewed by LESTER S. KING, *Member of Editorial Staff of The Journal of the American Medical Association, Chicago, Illinois.*

WHAT is the maximum allowable length for a "short history?" The query, not at all facetious, involves a basic principle of historical writing. A "short history" is by no means a shrunken version of a longer text. On the contrary, a short history must have its own special and characteristic point of view. It must seize upon a few guiding principles, a few key figures, and present them clearly and succinctly. While steadfastly renouncing the luxury of embroidered detail, it must retain simplicity, unity, and clarity.

The original edition of the present text, despite its faults, remained truly a short history which surveyed the field with a perspective appropriate to its scale. The new edition, although a far better book, distorts the perspective and is no longer a "short history."

Dr. Underwood, maintaining the general arrangement, has preserved what is essentially the original format up to the period beginning about 1825, the "period of consolidation." Adding briefly where indicated, correcting or deleting where necessary, he has made only modest changes in the first six chapters. The period from the dawn of medicine to about 1825 covered 185 pages in the first edition; in the new edition there are 204. However, the work from about 1825 onward is entirely re-written and vastly expanded, occupying 551 pages compared to 177 in the original. Over 70 per cent, then, of the new edition is devoted to the nineteenth and twentieth centuries.

This modern period is well analyzed, the many separate disciplines distinctly traced and well integrated. No two historians would make the same selection of figures for detailed discussion. It is not proper criticism to wonder why such-and-such was discussed at length and so-and-so not mentioned. Dr. Underwood's choice of figures results in an interesting discussion of the many-faceted nineteenth century medicine, but is somewhat less effective for the present century. The presentation does seem to jump back and forth in somewhat jerky fashion, but perhaps this is unavoidable.

But the book has lost proportion and unity. The last part, which offers substantially detailed exposition, could well serve as an independent history of the recent past. The first part, however, as a high-flying survey, offers a quite different perspective. The juxtaposition of the two modes of approach must impair the value of one part or the other.

When Dr. Underwood discusses the modern period at considerable length, he emphasizes a flaw of the original text. Singer tended to evaluate the great figures of the past in proportion to the degree that their views were "correct" by modern standards. There was praise for those who discovered something that is still acceptable today, and condescension towards those whose doctrines were "wrong." The new edition seems to continue this viewpoint. Clearly, the nineteenth century physicians were more nearly "correct" than were the earlier thinkers. Since Dr. Underwood treats the earlier periods quite briefly, there does not emerge adequate appreciation of the earlier incorrect views, nor delineation of a context in which those views were reasonable. With so much stress on the modern points of view, the students may have difficulty in achieving a true historical appreciation of the more remote past.

The present new edition is really two books in one. Each of them is good, but the blend is not entirely happy. Yet it reads well and yields considerable insight into the great traditions and achievements of medicine. It will be very useful for the student or physician who wants to survey the past. A substantial, well-classified biblography adds greatly to its value.

HERBERT THOMS. *Samuel Seabury—Priest and Physician, Bishop of Connecticut.* Hamden, Connecticut, The Shoe String Press, Inc., 1963, xiv, 166 pp., illus. $4.95.

Reviewed by DAVID HALL, *Acting Instructor, History and American Studies, Yale University.*

ONE of the many peculiarities of New England is that her sons have often followed after strange gods—strange, that is, in the light of their upbringing. Such deviations from the dominant pattern of culture provide the historian with important clews to otherwise hidden strains and stresses within the culture. Thus, the fascination of nineteenth-century New Englanders with Roman Catholicism reflects a drying up of the once rich vein of Puritan piety. Unable to sustain themselves on the arid rationalism of New England orthodoxy, these New Englanders found greater satisfaction in the resources of Rome, or, as in the case of Harriet Beecher Stowe, the Episcopal Church. In transferring her allegiance from the church of her fathers to Episcopacy, Harriet was making a change that, while momentous enough, was a familiar one in New England. Since the early eighteenth century, the Church of England had been functioning in the colonies as a haven for dispirited and discontented Puritans. This was especially true in Connecticut, where, in the absence of Unitarianism (for various reasons), Episcopacy became the only alternative to orthodoxy. A dramatic demonstration of its appeal was the mass conversion of the Yale faculty, announced at commencement, 1722.

Following this "earthquake," fourteen more Yale graduates defected during the next dozen years, some of them after having already entered the Congregational ministry. Among these latter was Samuel Seabury (who graduated from Harvard after attending Yale), father of Bishop Samuel Seabury, who is the subject of Dr. Thoms's most recent book. Dr. Thoms rightly begins his brief narrative of the life of the Bishop with an extended account of the events of 1722, for the lives of the Seaburys, father and son, were forever marked by them. Descendants of such revered Puritans as John Alden, the Seaburys, it might be said, proved themselves to be good Puritans by being such vigorous Episcopalians. The personality of the younger Seabury, in particular, reflects both his inheritance and the hostility which these early converts encountered. That hostility (on both sides) had its limits; the younger Seabury attended Yale College while Thomas Clap was president. But thereafter he came increasingly into conflict with his culture—the most celebrated, not to say notorious, example being his vehement espousal of the cause of Great Britain during the Revolution. Yet it is a measure of his greatness that once the Revolution was over, Seabury made his peace with an independent America, and channelled his urge to 'make good,' as it were, into the enormous effort

of strengthening the badly disrupted forces of Episcopacy. Perhaps more than Seabury himself realized, the force of character that enabled him to prevail in his quest for ordination as bishop was a legacy from the culture he had repudiated.

About a figure who has both his attractive and repellent sides, Dr. Thoms writes from the position of an amateur historian inspired by a deep admiration for his subject. His narrative, as he explains, is not intended to replace the two older, and bulkier, biographies of the Bishop. It is, however, a brief, lively, and useful portrait.

GEORGE WINSTON SMITH. *Medicines for the Union Army. The United States Army Laboratories during the Civil War.* Foreword by Glenn Sonnedecker. Madison, Wisconsin, American Institute of the History of Pharmacy, 1962. v, 119 pp., 8 illus. $2.75.

Reviewed by JAMES HARVEY YOUNG, *Professor of History, Emory University, Atlanta, Georgia.*

THE controversial Surgeon General, William A. Hammond, following a small-scale prewar Navy precedent, established two large pharmaceutical manufacturing laboratories to help provide medicines for the Union Army. Begun early in 1863, the laboratory at Astoria on Long Island was all but destroyed by fire two years later; the more extensive Philadelphia laboratory continued in large-scale operation until late in 1865 and did not close until May 1868. Despite some opposition from private industry and an awkward plan of overhead authority, the plants were efficiently and imaginatively run, producing vast quantities of drugs of high quality at some savings in cost to the government. Significant technological advances were made especially at Philadelphia by the pioneering chief chemist, John Michael Maisch.

The six-volume *Medical and Surgical History of the War of the Rebellion* devotes only two short paragraphs to the laboratories. Professor Smith, in his compact, attractive, paperbound volume, remedies this neglect. Based on primary sources from governmental and private archives, the narrative is clear and concise. The author sets the stage by describing the medical purveying system employed during the war. He tells of the establishment and operation of the laboratories, indicating the medicines prepared, and something of the manufacturing processes employed. Consideration is given to drugs (like quinine sulfate) which might have been manufactured but were not. A judicious evaluation concludes that the laboratories played a beneficial role without injury to the private pharmaceutical industry.

Appendices bring together helpfully such data as the medicines listed on the army supply table during the war, the contents of the Autenrieth

medicine wagon, and ingredients contained in the army medicine Pannier packed by E. R. Squibb. More detailed information on Civil War drug prices and on the quantity of medicines produced at the army laboratories is offered the interested reader on microfilm for a modest additional fee, a novel technique worthy of emulation elsewhere in scholarly publishing.

What new insights into therapeutic practices—and debates—of the Civil War era might be gleaned from the experience of the army laboratories? Some useful information is given (pages 66-70, for example). Medical historians might wish for a still more elaborate therapeutic analysis of the long lists of drugs in the appendices than Professor Smith provides in his main text. Also, except for mention of Squibb's initial opposition to the establishment of Astoria, no discussion is devoted to the view taken by private industry of this competition from the government. Perhaps, despite Professor Smith's diligence, he was unable to find sources for the study of such attitudes. The reviewer would also have enjoyed fuller biographical treatment than is given for the key figures in this intriguing tale.

The over-all verdict is distinctly favorable. Medical and pharmaceutical historians should be grateful to the author and the publisher for this well-defined, well-researched, and well-structured study.

MORRIS GORLIN, Ed. *Maimonides "On Sexual Intercourse."* Translated from the Arabic with an Introduction and Commentary. Medical Historical Studies of Medieval Jewish Medical Works, Vol. 1. Brooklyn, Ramdash Publishing Co., 1961. 128 pp. $10.

Reviewed by MARTIN LEVEY, *Department of History of Science and Medicine, Yale University School of Medicine.*

THE subject of sex in mediaeval Arabic times was treated with a great deal of freedom of expression, much more so than today. Practically all important physicians felt impelled to inform the public of what they knew of the science of sex and intercourse, the *cilm al-bāh*. This area was considered as a branch of medicine.

One of the early books (possibly twelfth century) on sex was the *Alfiyya Shalfiyya,* most of whose material originated in India. The title is considered to mean, "The Story of the Woman Who Had a Thousand Lovers." In the miniatures of this work, there are many stylized poses and figures.

Most of the remainder of the works on this topic described sex in exactly the same terms. The work of Maimonides is one of this mediocre group.

This little volume, according to the title page, is from the Arabic. Ultimately this is true since Maimonides wrote his scientific books in

Arabic. However, the statement is misleading since the editor in this case does not claim to have used the Arabic but "the main source utilized is the German translation of Kroner in *Janus,* 1916."

The pharmacological notes are unreliable, the English is poor, and the remarks in the appendices on related literature are almost entirely without discrimination.

ANDRÉ HAHN, PAULE DUMAITRE, and JANINE SAMION-CONTET. *Histoire de la Médecine et du Livre Médical.* Paris, Olivier Perrin Editeur, 1962. 430 pp., illus.

Reviewed by EDWIN CLARKE, *Visiting Associate Professor of the History of Medicine, Yale University School of Medicine.*

THE Library of the Faculty of Medicine of Paris was established in 1395 with 13 books. Today it has about 800,000 and its curators have had the praiseworthy idea of telling the story of medical history illustrated by choice volumes from their splendid collection. This sumptuous book is the result.

First, there is an excellent history of the Library followed by chapters dealing separately with the fifteenth to nineteenth centuries. Each of the latter has a brief summary of the century's medical achievements, a discussion of book production in general, and of selected medical books during the period; the chapters on the seventeenth and eighteenth centuries include a consideration of illustrated theses and medical journals. The last chapter describes noteworthy *ex-libris.* The bibliography includes references to publications on general medical history, on the history of the Faculty, on the book in general, and on medical books. Finally, there is a description of each of the 274 illustrations together with their source.

The outstanding feature of this book is the illustrations taken from the Faculty volumes. Many of them are full-page in size, eight are in excellent color, and on the whole their reproduction is very good. It is only the text that can be criticized.

In the first place the title does not reveal accurately the nature of the contents. The latter show that it is really a history of the illustrated medical book. This accounts for its lack of balance, for since the authors are especially interested in anatomical and surgical illustrations, the seventeenth century is dealt with in 71½ pages and the nineteenth, in 26½. But if the present title is discounted, this is not a major criticism. There are, however, serious defects. The introductory surveys of each century's activities are very poor, and there is constant over-emphasis of French contributions to medicine, for which the holdings of the Library cannot be entirely responsible. The nineteenth century survey deals unashamedly

and almost exclusively with French medicine. The only German mentioned is Hahnemann, Britain is represented by Willan, John Bell, and Lister (said to be a Scotsman), and the United States by Morton and Jackson (with a confusion of dates here). For the century's books, 17 out of the 26 selected are French and there is no reference to American works even in the text. Also there are numerous mistakes, frequent repetition, and grave deficiencies of selection throughout the work. Thus, Jenner's *Inquiry* is not shown, nor are Aselli's colored plates; the latter omission results from the fact that the Library does not have the book, thus revealing an obvious defect of the authors' plan.

If we are to have an illustrated history of medicine, their scheme is probably the best. The reconstructed scenes, the perennial picture, and the supposed portraits of ancient writers are thus avoided. Although this book provides an attractive collection of good illustrations well described, and thus complements Choulant, its general structure is unfortunately faulty. Rather than a "History of medicine and of the medical book" (with a subtitle referring to the Faculty Library) it is a "History of illustrated medical books, especially French, from the Library of the Faculty of Medicine of Paris"; and the limitations suggested by this title are to be found in it.

ERNA LESKY. *Österreichisches Gesundheitswesen im Zeitalter des aufgeklärten Absolutismus (Archiv für Österreichische Geschichte, 122.*Band, 1. Heft). Wien, Rudolf M. Rohrer, 1959. vii, 228 pp., Ö.S. 82.50.

Reviewed by GEORGE ROSEN, *Professor, Health Education, Columbia University, New York City.*

IT is a great pleasure to review this excellent monograph by Dr. Lesky on public health in the Austrian Empire during the period of enlightened absolutism, that is, the reigns of Maria Theresa and Joseph II. Solidly based on archival materials as well as other sources, it traces the evolution of public health legislation, administration, institutions and programs from 1753 when the *Sanitäts-Hofdeputation* was established, to the decentralization that followed after 1776.

The *Sanitäts-Hofdeputation* was a central health commission responsible directly to the monarch. Its first major enactment was the *Haupt Mediznial-Ordnung of 1753* for Bohemia. This act was largely concerned with medical care administration, and employed an administrative structure centered on the district office (*Kreisamt*), which was introduced the same year into all the Austrian patrimonial dominions. Two years later, it enacted a marine quarantine law. These two major achievements prepared the way for a public health law to cover all the provinces of the Empire.

Work on the *Sanitätsnormativ* began in 1765, and it was enacted in 1770. Inclusive in nature, this law dealt with quarantine, forensic medicine, vital statistics, veterinary medicine, and various aspects of medical care administration, such as education and training of medical personnel and control of pharmacies. Moreover, it established the basic responsibility of the central government in health matters. From this point on, the *Sanitäts-Hofdeputation* declined in significance, and in 1776 its functions were transferred to other government departments.

One of the major points of interest in Dr. Lesky's study is her analysis of the role of Gerard van Swieten. Although not a member of the *Sanitäts-Hofdeputation,* van Swieten was highly influential in shaping the developments sketched above. As president of the medical faculty and Protomedicus, he was the leading physician of the Empire. In this position, he was consulted by the *Sanitäts-Hofdeputation* on a wide variety of subjects. Van Swieten acted essentially as the chief medical officer of a ministry of health, but his powerful position near the Empress gave added weight to his views. As a result he made important contributions to Austrian public health, and was an outstanding health leader and administrator.

These developments occurred in a specific intellectual and social atmosphere, in which the decisive men had definite goals determined by common values. The concepts of cameralism and medical police sum up this milieu, and Dr. Lesky discusses their foundations, the goals which they involved, and the means considered necessary to achieve them. She also indicates the relevance of these ideas to the Josephinian reforms and state interventionist policies.

The two final chapters of this book deal respectively with special public health problems (plague, smallpox, venereal disease, and burial, apparent death and life-saving), and with three personal physicians to the Habsburg rulers who also held the office of Protomedicus (Gerard van Swieten, Anton von Störck, and Joseph Andreas von Stifft).

In summary, this is an important contribution to the history of public health, not only in Austria, but as well within the large European framework.

COSTANTINO L'AFRICANO. *Della Melancolia.* Roma, Istituto di Storia della Medicina, 1959. 166 pp.

Reviewed by GEORGE MORA, *Medical Director of the Astor Home for Children, Rhinebeck, New York.*

SINCE the discovery of the *Compendium Salernitanum* by August Henschel in 1837, historical studies on Salerno's medical school have progressed steadily. It is enough to mention the names of S. DeRenzi, Ch. Daremberg,

P. Giacosa, P. Capparoni, and more recently P. O. Kristeller and A. Beccaria.

The present book *On Melancholia* by Constantinus Africanus—which continues this tradition of studies—is one of several publications recently edited by the Institute of the History of Medicine of Rome under the leadership of A. Pazzini. Like the other "magistri salernitani," Constantinus remains today somewhat legendary. His main merit consists in having introduced to Salerno, and therefore into Western culture, the old medical tradition as preserved and modified by the Arabs.

Among the many books attributed to Constantinus, this on melancholia is the only one on psychiatry. The two translators and editors, M. T. Malato and U. de Martini, present first a critical history of the text and a summary of the content of the book, then the Latin version of the "Codex Vaticanus" lat. 2455 (Basel, 1536) duly corrected, an Italian translation of the text, and finally the photostatic reproduction of the "Codex Vaticanus," in addition to a bibliography and a glossary of drugs named in the text. There is no question in the mind of the editors that Constantinus' work is simply a summary of the best writings of the classical tradition on the subject of melancholia, especially by Rufus of Ephesus (first or early second century A.D.), by Rhazes (865-925 A.D.) and even more by Ishak Ibu Amran, Persian physician and botanist of the ninth-tenth century A.D. R. W. Creutz, who had made a critical German translation of the "De Melancholia" thirty years ago, had already expressed the same opinion, here re-emphasized with the support of additional data. What then is the essence and the importance of Constantinus' work? The black bile—a natural component of the human body—becomes pathological in certain circumstances, either congenital for a defect in the human constitution or later on for an unbalance of the equilibrium of the body systems. When the black bile arrives at the brain, it produces a "phrenitis," namely, a delirium accompanied by clouded sensorium (probably a meningo-encephalitis) or epilepsy, which for Constantinus is a variety of "apoplexis." When the black bile remains around the "mouth of the stomach," it produces a hypochondriacal syndrome with local and general symptoms, characterized by difficult digestion, by sadness, fear, delusions, hallucinations, phobias, sleeplessness, loss of interest in himself or in the environment, and at times by hatred toward his closest relatives. These symptoms belong to different patterns of modern psychiatric nosology, and the statement of the editors (p. 36) that "essentially Constantinus' melancholia corresponds to a manic-depressive psychosis" is untrue. Constantinus' attempt to separate symptoms into patterns is more confusing than helpful. Here and there, however, are very acute observations, such as that the prognosis is better in phobic patients (p. 109) with recent onset of symptoms (p. 124) and

worse in those who refuse to eat (p. 107) and in those who refuse treatment (p. 131). In the light of modern psychiatry, Constantinus' hints as to psychotherapy are especially significant: "It is important to use reasonable and kind words,—and it is important to free the mind from the troublesome things with help of music and very clear and light wine" (p. 117). In addition to diet, drugs and physical exercises, ablutions and baths followed by massages were recommended in line with the Hippocratic tradition, (p. 118). Clearly, this treatise shows the transition from the classical to the medieval world, from the magical to the scientific approach to medicine.

L. D. HEATON, J. B. COATES, JR., and W. P. HAVENS, JR. *Medical Department United States Army, Internal Medicine in World War II, Vol. 1. Activities of Medical Consultants.* Washington, D. C., Office of the Surgeon General, Department of the Army, 1961. xxxii, 880 pp., 277 illus., 17 charts, 7 maps, 14 tables. $7.50.

Reviewed by LOUIS H. NAHUM, *Lecturer in Department of Physiology, Yale University.*

TEN years elapsed before the publication of the experiences recounted in this book. This hiatus provided an opportunity for consideration and reassessment of living situations and for placing them in an historical perspective. Nevertheless, the book is not really historical but autobiographical since it includes only the more general aspects of problems described by the medical consultants themselves. It is a record of their wartime experiences and contains a frank account of errors. The embarrassing position with regard to rank, the inconvenience and inefficiency caused by lack of effective channels of communication between themselves and the office of the Surgeon General, problems of personnel, supply, hospitalization, and evacuation, as well as clinical problems, all had to be resolved.

Many troubles arose because of the consultants' lack of experience in military matters and an initial failure on the part of the regular army officers to appreciate what the consultants had to offer in the way of specialized service. Often the consultants worked at headquarters where they encountered indifference and at times even hostility. Only gradually did the opposition disappear; the consultant system then became widespread.

The goal of the consultant system in internal medicine and subspecialities was clear: to provide means for prompt and accurate diagnosis and optimum therapy. But there was a startling lack of personnel; and the limited number of qualified people were not always used to greatest advantage. Nevertheless, by visiting hospitals and other installations,

reviewing and analyzing protocols, the consultants were able to check the care of the patients, correct errors, overcome ignorance, observe and evaluate performance of individual medical officers, and generally insure that sick soldiers were receiving the best possible care. Finally, they had to direct the care of every conceivable civilian disease, and in areas like India and Burma these diseases were strange indeed and not seen in the U.S.A. How they helped to solve allergic diseases, tropical diseases, malaria, neuropsychiatric problems, and a host of other troubles is recounted in these pages, and at times it makes fascinating reading. All this the consultants did without administrative provision for research. New methods of treatment had to be worked out for unfamiliar diseases; new agents such as atabrine, penicillin, streptomycin, and sulphonamides had to be tested, for in tropical climates they required some form of adjunct therapy.

One interesting part of this book is the story of the warm, helpful relations between the U.S. Army Medical Officers and those of our allies. Twenty-four interallied conferences with 220 speakers and 6,500 in attendance show that medicine is really a universal language transcending nation and race and one that can unite humanity.

This volume has much in it of permanent value for medicine, and it is hoped that the lessons learned from the experiences of the nine consultants will be used to promote health and welfare in a peaceful world rather than, as Heaton says in the introduction, "to determine the measures which can be most usefully employed in war-time." Can it be that Heaton is not aware of the fact that in the next war there will be left neither civilians, nor soldiers, and there will be no consultants to be found, even if they were to be needed?

BOOK NOTICES

HENRY K. BEECHER and CHARLOTTE FORD. *A Bibliography of the Publications of the Anaesthesia Laboratory of the Harvard Medical School at the Massachusetts General Hospital.* Baltimore, The Waverly Press, 1962. xix, 54 pp.

THIS attractively presented bibliography of some 285 papers and monographs summarizes the contributions made to anesthesia by the group at the Massachusetts General Hospital over the last 25 years. It is certainly a tribute to Dr. Beecher. It is also a powerful illustration of the historical changes which have taken place over the last 25 years regarding the

role of academic anesthesia and the contributions it can make both to basic research and to clinical medicine. The noteworthy foreword by Dr. Edward D. Churchill emphasizes the significance of these changes and is a fitting addition to such a publication.

NICHOLAS M. GREENE, M.D.

DONALD E. KONOLD. *A History of American Medical Ethics, 1847-1912.* Madison, Wisconsin, The State Historical Society of Wisconsin, 1962. vii, 119 pp. $3.50.

MEDICAL ethics has a long and interesting history but no recent comprehensive survey of it has yet appeared. A very small section of it is covered by this Ph.D. thesis which traces the evolution of the American Medical Association's code of ethics over the 65 years from its inception to its second revision. It thus concerns an extremely important period of American medicine and is thorough, well written and well documented, if at times somewhat naïve. Practical aspects of ethical controls are emphasized, especially their rôle in the control of quackery. The relations of ethics to research and of physicians to laymen are discussed, as well as fees. There is also a brief account of events since 1912.

At a time when medical care, the public image of the doctor, and medical ethics in general are often under discussion, a survey of the origin of ethical standards is an important and useful contribution to what the author correctly claims is a neglected part of the intellectual history of this country.

EDWIN CLARKE, M.D., M.R.C.P.

RICARDO ARCHILA. *Bibliografía Médica Venezolana.* Tercera Edición 1952-1958. Caracas, Impenta Nacional, 1960. xl, 494 pp.

THE first edition under this title appeared in 1946, the second in 1955, and the third, considered by the compiler to be *Addenda,* in 1960. The bibliography is arranged in alphabetical order of both authors and subjects and includes 5,367 medical titles published in Venezuela between 1952 and 1958 by 1,561 authors. Besides this information it contains a list of physicians who died during that period accompanied by short biographies; a catalogue of books published in those years with their reviews; and the titles of scientific films produced in Venezuela.

This bibliography confirms once more Archila's prestige as an outstanding and accurate bibliographer and emphasizes the lack of similar works throughout Spanish America.

F. GUERRA, M.D., Ph.D.

STEPHEN B. DEWING. *Modern Radiology in Historical Perspective.* Foreword by Maxwell H. Poppel. Springfield, Illinois, Charles C Thomas, 1962. ix, 189 pp. $5.75.

THE author's praiseworthy aim was to provide historical perspective for the modern specialty of radiology, and this book is based on his course in a training program. He discusses the background before Roentgen's discovery of 1895 and then gives biographical sketches of Roentgen, Becquerel, and the Curies. Progress since 1895 is divided into theoretical and technical advances, the growth of medical and nonmedical uses of Roentgen rays, and the history of radioactive hazards and of radiation hazards. Finally, there is useful advice to embryo radiologists.

Unfortunately, the origins of Roentgen rays and radioactivity, which the author seeks in the atomic theory, transmutation of matter, and modern physics, are naïvely presented and they are not wholly convincing, nor are they adequately developed. Furthermore, he is dealing almost exclusively with American sources; among nearly 200 references only three or four refer to non-American material. As a repository of American literature on the history of radiology the book is therefore valuable. The author has recorded his lectures as they were delivered (complete with colloquialisms and chatty, personal, but usually irrelevant, anecdotes) and at times his prose degenerates into a staccato catalogue of events.

EDWIN CLARKE, M.D., M.R.C.P.

KURT KOLLE. *Grosse Nervenärzte.* Band 3. Stuttgart, Georg Thieme Verlag, 1963. vi, 228 pp,. illus. DM 32.- Available in U.S.A. and Canada: Intercontinental Medical Book Corporation, New York 16, New York.

THIS volume brings the total of biographies in the series to 65. Anatomists, physiologists, neurologists, neurosurgeons, psychiatrists, and psychologists who have worked in the nineteenth or present century are included. The editor has had a difficult task selecting his cast but even despite the outstanding contributions of Germany and Austria there is a predominance of German-speaking representatives. Yet Duchenne de Boulogne and Gowers are excluded and only three Americans (Cushing, Dandy, and Adolf Meyer) are included. There is inevitable overlapping with *The Founders of Neurology* (Haymaker, 1953) and *50 Jahre Neuropathologie in Deutschland* (Stuttgart, 1961).

The essays are uneven but on the whole very good, with adequate documentation and a portrait of each biographee. The biographical material on the great figures of the neurological sciences now seems to be more extensive than that of any other specialty.

EDWIN CLARKE, M.D., M.R.C.P.

D. P. HALL. *Our Surgical Heritage.* Foreword by Robert M. Zollinger. Reprinted from *The American Journal of Surgery.* New York, The Reuben H. Donnelley Corporation, 1962. viii, 80 pp., illus. $6.00.

DESPITE Dr. Zollinger's claim that this book contains "50 or more" biographical sketches of famous surgeons, there are only 40, twenty dealing with Americans and twenty with Europeans. Each has appeared in the *American Journal of Surgery* between 1959 and 1961 and each consists of a portrait and a short account of the individual, often inaccurate and frequently anecdotal; there are no references, and typographical errors are frequent. The selection of representatives is difficult to understand. The title, *Our Surgical Heritage,* perhaps explains the high proportion of Americans, but it is difficult to agree that John Morgan and William Beaumont were outstanding surgeons as such; the author has obviously found it difficult to match the Europeans. Moreover, to exclude Paré, the Hunters, and Lord Lister is quite inexcusable. A sinister feature of this publication is that distribution to students and practitioners of surgery seems to constitute the reason for its present form, and purchasing in bulk is encouraged. It is a pity that these sketches have been resurrected and have not been granted the obscurity that they so richly deserve.

EDWIN CLARKE, M.D., M.R.C.P.

ROBERT H. IVY. *A Link with the Past.* Baltimore, Maryland, The Williams & Wilkins Company, 1962. viii, 148 pp., 21 illus. $4.00.

THIS autobiography, which documents the life and work of a pioneer in maxillofacial and plastic surgery, is written in readable style.

Robert Henry Ivy was born in Lancashire, England, on 21 May 1881. After boyhood in England, China, and France, he entered the University of Pennsylvania and received his dental degree in 1902. After dental internship at the Philadelphia General Hospital and practice in China for two years, Ivy returned to complete his medical studies in 1907. Early in 1917, Dr. Ivy was assigned to the Office of the Army Surgeon General to assist in organizing a Sub-Section for the care of war injuries of the face and jaws.

Appointed Professor of Maxillofacial Surgery in the University of Pennsylvania School of Dentistry in 1919, residency training in maxillofacial surgery was organized under his direction in 1932; a growing number of skilled specialists led to the founding of the American Board of Plastic Surgery in 1937.

Recollections of travels, people, and events fill this well-written book. A bibliography of Dr. Ivy's publications concludes the volume.

FRED B. ROGERS, M.D.

HISTORY OF SCIENCE SOCIETY OF JAPAN. *Japanese Studies in the History of Science, No. 1.* Tokyo, History of Science Society of Japan, 1962. 140 pp., illus. $5.00.

IN 1962 the History of Science Society reached its majority and this publication commemorates the event. Articles first of all survey the fields of the history of science, medicine, and technology in Japan and then deal with specific topics, the majority of which concern the physical sciences. Only one paper, "A survey of the interest for the history of medicine in Japan," is devoted entirely to medical history. It is of considerable interest to note the various approaches which the Japanese have made, and are making, to the discipline. These are necessarily limited, due mainly to problems of language but, on the whole, they seem to be healthier than those of some other Eastern countries.

EDWIN CLARKE, M.D., M.R.C.P.

BOOKS RECEIVED

Whipple, Allen O. *The Story of Wound Healing and Wound Repair.* Springfield, Illinois, Charles C Thomas, 1963. xiii, 135 pp., 13 illus. $5.75.

Haller, Albrecht von. *Abhandlung über die Wirkung des Opiums auf den menschlichen Körper,* Erich Hintzche and Jörn H. Wolf, trans. Bern, Verlag Paul Haupt, 1962. (*Berner Beiträge zur Geschichte der Medizin und der Naturwissenschafte,* Nr. 19.) 30 pp., 1 illus. Sw. Fr. 6.80.

Guggenbühl, Dietegen. *Gerichtliche Medizin in Basel von den Anfängen bis zur Helvetik.* Basel, Benno Schwabe and Co. Verlag, 1963. (*Basler Veröffentlichungen zur Geschichte der Medizin und Biologie,* Fasc. XV.) 111 pp., 9 illus. $4.00.

Osmania Medical College. *Bulletin of the Department of History of Medicine.* D. V. Subba Reddy, Editor. Vol. 1, No. 1, January 1963, Hyderabad (India). ii, 65 pp., 4 illus.

Burr, H. S., Ed. *Classics in Neurology.* Selected by Richard Sherman Lyman. Springfield, Illinois, Charles C Thomas, 1963. vii, 176 pp. $6.50.

Tabanelli, Mario. *La Medicina nel mondo degli Etruschi.* Firenze, Leo S. Olschki Editore, 1963. (*Biblioteca della "Revista di Storia delle Scienze Mediche e Naturali."* Vol. XI.) 129 pp., illus. Lire 4,000.

Coates, John Boyd, Jr., Ed. *Internal Medicine in World War II.* Vol. II. *Infectious Diseases.* Washington, D.C., Office of the Surgeon General, Dept. of the Army, 1963. 649 pp., 60 illus., 36 charts, 76 tables.

Burrow, J. G. *AMA: Voice of American Medicine.* Baltimore, Maryland, The Johns Hopkins Press, 1963. 430 pp. $7.50.

Landsteiner, Karl. *The Specificity of Serological Reactions.* New York, N.Y., Dover Publications, Inc., 1962. 330 pp. $2.00.

Ewan, Joseph and Nesta. *John Lyon, Nurseryman and Plant Hunter, and His Journal, 1799-1814, (Transactions of the American Philosophical Society,* Vol. 53, pt. 2) Philadelphia, American Philosophical Society, 1963. 69 pp. $2.00.

Doby, Tibor. *Discoverers of Blood Circulation.* London, New York, Toronto, Abelard-Schuman, 1963. 285 pp. $6.50.

Garosi, Alcide. *Inter Artium et Medicinae Doctores.* Florence, Leo S. Olschki, 1963. 395 pp.

Proceedings of the Royal Society of Medicine. Supplement, Section of the History of Medicine Jubilee Meeting 1912-1962. London, Royal Society of Medicine, 1963. 70 pp. $3.00.

Pinero, Jose Maria Lopez and Entralgo, Pedro Laín. *Panorama Historico de la Ciencia Moderna.* Madrid, Ediciones Guadarrama, 1963.

Pinero, Jose M. Lopez. *Orígenes Historicos del Concepto de Neurosis.* Valencia, Spain, Industrias Graficas ECIR, 1963. 214 pp.

Sevilla, Pilar F. and Pinero, Jose M. Lopez. *Catalogo de la Biblioteca Historico-Medica de la Facultad de Medicina de Valencia.* Valencia, Spain, Industrias Graficas ECIR, 1962. 103 pp.

Ballester, Luis G. and Pinero, Jose M. Lopez. *Antologia de la Escuela Antómica Valenciana del Siglo xvi.* Valencia, Spain, Industrias Graficas ECIR, 1962. 71 pp.

NOTES ON CONTRIBUTORS

VERN BULLOUGH, Ph.D., is Associate Professor of History, San Fernando Valley State University, Northridge, California.

W. W. FRANCIS, M.D., 1878-1959, was formerly Librarian, Osler Library, McGill University, Montreal, Canada.

DEXTER H. HOWARD, Ph.D., is Assistant Professor of Medical Microbiology at the University of California at Los Angeles, UCLA Medical Center, Los Angeles 24.

GORDON W. JONES, M.D., F.A.C.S., is engaged in the practice of obstetrics and gynecology. His address is Medical Arts Building, 2301 Fall Hill Avenue, Fredericksburg, Virginia.

LESTER S. KING, M.D., is a member of the editorial staff of *The Journal of the American Medical Association* and Clinical Professor of Pathology at the University of Illinois College of Medicine (address: 535 North Dearborn Street, Chicago 10, Illinois).

JOSHUA O. LEIBOWITZ, M.D., is Associate Clinical Professor in Medical History, Hebrew University, Jerusalem, Israel.

JAMES E. O'NEILL, Ph.D., is Assistant Professor of History at the University of Notre Dame, Notre Dame, Indiana.

GEORGE ROSEN, M.D., D.P.H., Ph.D., is Professor of Health Education and Chairman of the Department, Columbia University School of Public Health, 600 West 168th Street, New York 32, New York.

LLOYD G. STEVENSON, M.D., Ph.D., is Dean of the Faculty of Medicine, McGill University, Montreal, Canada.

Jacques Loeb: The Man and His Tropism Theory of Animal Conduct

ARNOLD E. S. GUSSIN*

IN 1921 Jacques Loeb, then head of the Division of General Physiology at the Rockefeller Institute for Medical Research, sent a copy of his 1918 book, *Forced Movements, Tropisms, and Animal Conduct*,[1] to the late Supreme Court Justice, Louis D. Brandeis. In an accompanying letter,[2] Loeb wrote: "I think one day—by some future generation [the ideas put forth in my book]—may be elaborated into a mathematical theory of human conduct."[3] Loeb, as this remark implies, was not completely objective about his tropism theory. Although he vehemently denied it, in this area his science and his philosophy were intermixed.

Loeb maintained[4] in 1918 that one of the reasons the acceptance of his tropism theory had been delayed—it had initially been proposed in 1890—was "because the Aristotelian viewpoint still prevails to some extent in Biology." A question immediately comes to mind: What was this Aristotelianism that Loeb took issue with? In brief, Loeb's argument with Aristotle was the latter's insistence that everything exists to serve a given purpose. Since existence has its origin in a supreme intelligence, everything that happens has an intellectual cause and thus acquires a dogmatic arbitrariness. Natural laws are not an act of nature itself, but rather a product of divine wisdom. A thought-system such as this could easily solve, with abstract catchwords, all problems posed by natural phenomena: a stone falls because it is heavy, fire rises because it is light. Indeed, Aristotle's philosophy induced a feeling of self-complacent satisfaction with the nature of the universe, and fifteen

* U.S. Public Health Service Postdoctoral Fellow, Department of Biology, Yale University.

1 Loeb, Jacques. *Forced movements, tropisms, and animal conduct.* Philadelphia, J. B. Lippincott Company, 1918. 209 pp.

2 The author gratefully acknowledges his indebtedness to Mrs. W. J. V. Osterhout, who graciously informed him that the letters of Jacques Loeb were in the Library of Congress. Appreciation is also extended to the librarians in the Manuscript Division at the Library who allowed the writer to study the "Jacques Loeb Letters" before they had been catalogued. Dr. Mac V. Edds, Jr. suggested Loeb as a fascinating personality who required further study, and critically read the manuscript.

3 Letter to Justice Louis D. Brandeis, 11 October 1921.

4 Loeb, *op. cit.*, pp. 17-18.

centuries after its proposal still led to stagnation and obedience to authority.

C. C. Gillispie, in a recent book,[5] further explains the nature of the Aristotelian science that Loeb blamed for delaying the acceptance of his tropism theory. It ". . . started inside the mind whence concepts like purpose, soul, life, and organism were projected outwards to explain phenomena in the familiar terms of self-knowledge. In those terms the success of an explanation depended only on its universality and capacity to satisfy the reason." The goal of this science, Gillispie continues, "was to achieve a rational explanation of the world by showing how the myriad subordinate means are adapted to the larger end of order." Jacques Loeb's science, although based on experiment and mathematical expression, was similarly oriented in that it aimed at understanding universal truths which were based on purely physico-chemical mechanisms and which were explainable by the application of pure reason. In the interpretation of data gleaned from his experiments on animal conduct Loeb disregarded Aristotle's "purpose," substituting for it "purely physico-chemical mechanisms." The complex reactions of animals were reduced by him to purely quantitative laws, to tropisms, and forced movements. But "nature is not like that, not an enlargement of common sense arrangements, not an extension of consciousness and human purposes. She is more elusive, . . . more subtle, hiding her ways . . . , and only occasionally yielding glimpses of great order. . . ."[6] Jacques Loeb's "glimpse of great order," the tropistic theory of animal conduct, has not stood the test of time. Although his approach was different, in his search for universal truths he approximated the ancients.

There is one universal truth, put forth by Charles Darwin in 1859, that has managed to stand the test of time. The theory of evolution did impart a unity of lasting value to biology, but it was not without unfortunate side-effects. The publication of the *Origin of Species,* for example, led to an anthropomorphic interpretation of animal behavior; the distinction between man and other animals became less distinct, with behavior being "described and explained in terms of subsequent events, results, purposes, and objectives, in teleological terms. . . ."[7] As an extreme

[5] Gillispie, Charles C. *The edge of objectivity, an essay in the history of scientific ideas.* New Jersey, Princeton University Press, 1960. 562 pp. (pp. 10, 12).

[6] *Ibid.,* p. 13.

[7] Fraenkel, Gottfried S. and Gunn, Donald L. *The orientation of animals.* London, Oxford University Press, 1940. 376 pp. (p. 4).

reaction to this "rejuvenated Aristotelianism," Jacques Loeb, among others, attempted "to interpret the whole of animal behavior including that of man"[8] in physical and chemical terms. He maintained that evolutionary hypotheses were not subject to experimental verification and pointedly ignored them in his writings.

The dedication of one of Loeb's major works, *The Organism as a Whole*,[9]

> to that group of free-thinkers, including D'Alembert, Diderot, Holbach and Voltaire, who first dared to follow the consequences of a mechanistic science, incomplete as it was, to the rules of tolerance, justice and gentleness which was the hope of our civilization until it was buried under the wave of homicidal emotion that swept through the world

further strengthens the view that Loeb thought the physicochemical, or mechanistic approach to be universal; the new evolutionary theory was an encumbrance to be disregarded when studying animal behavior. Human attributes such as "good," "evil," and "ethics" were amenable to solution,[10] however, if they were considered within the framework of the tropism theory.

Perhaps it is advisable before proceeding to explain what is meant by the "tropism theory." The term tropism[11] has been frequently used in different senses by different authors. Originally it was reserved by the botanist de Candolle, in 1835, for the turning movement of plant stems toward the light. Loeb used the term to connote a directed movement, whether it was the curvature movements of plants or the locomotory movements of animals. In the early decades of the twentieth century tropism came to mean not only a direct reaction but also such a reaction with the particular kind of mechanism postulated by Loeb (see below). Hence, when tropisms were mentioned, it was generally the tropism theory of animal conduct that was being referred to and not directed plant movements. Tropism had become a key-word; it was used to "explain" most of the behavioral phenomena of primitive organisms, and advanced organisms also.

Jacques Loeb's views on this tropism theory of animal conduct were succinctly outlined in a letter written to a colleague in England: "The goal [of the tropism theory]," he wrote, "is a mathematical formulation of the laws of animal conduct, or in

[8] *Ibid.*, p. 4.

[9] Loeb, Jacques. *The organism as a whole*. New York, G. P. Putnam's Sons, 1916. 379 pp.

[10] Loeb, Jacques. Freedom of will and war. *New Review*, 1914, 2, 631-636.

[11] From the Greek "turning."

other words, a scientific treatment of the conduct of animals or plants from the viewpoint of the physicist. The method is also the same as that of the physicist, namely, quantitative investigation of the physico-chemical conditions underlying animal reactions."[12] Loeb argued that most animals were merely bilaterally symmetrical machines, both morphologically and physiologically. Light, for example, shining more brightly on one eye than the other would cause an unequal stimulation of the optic nerves, which in turn would cause an unequal stimulation of the symmetrical body muscles. As a consequence the direction of movement of the organism was changed until the light stimulus again fell with equal intensity on the two eyes. The reaction of the animal to light was involuntary or innate; "it is an inflexible part of the organism's inherited physiological apparatus" and "is not subject to modification or control by the organism."[13]

> What has been stated for light holds true also if light is replaced by any other form of energy. Motions caused by light or other agencies appear to the laymen as expressions of will and purpose on the part of the animal, whereas in reality the animal is forced to go where carried by its legs. For the conduct of animals consists of forced movements.[14]

It is fitting to use as a concrete example of the tropism theory the behavior of the larvae (caterpillars) of the butterfly, *Porthesia chrysorrhoea,* since these organisms were studied by Loeb in his earliest experiments. In their natural habitat, at the termination of the winter hibernation period, the larvae climb to the tips of branches where they find the opening buds which are their food. Prior to Loeb's researches it might have been thought "that the larvae found the right situation . . . by a marvelous instinct,"[15] or perhaps that they "smelled the food, liked the smell, and decided to eat."[16] Loeb cut through this anthropomorphism with a few simple experiments designed to show that the organisms were "slaves of the light."[17] When a test tube containing larvae was placed at right angles to a window, all the animals moved toward the window, where they remained permanently. If the tube was then rotated through an angle of 180 degrees, the animals moved toward the window again. The experiment could be re-

12 Letter to Dr. W. B. Brierly, 1 May 1920.

13 Simpson, George G., Pittendrigh, Colin S., and Tiffany, Lewis H. *Life, an introduction to biology.* New York, Harcourt, Brace and Company, 1957. 845 pp. (p. 232).

14 Loeb, *op. cit.* (n. 1), p. 14.

15 Osterhout, W. J. V. Jacques Loeb, biographical sketch. *J. gen. Physiol.,* 1928, *8,* ix-xcii.

16 Simpson, *et al., op. cit.* (n. 13), p. 230.

17 Loeb, *op. cit.* (n. 1), p. 49.

peated indefinitely. In fact, the larvae acted "like photochemical machines to such an extent that if food was placed behind them when they are starving they are unable to turn their heads away from the light to take nourishment."[18]

Loeb considered his theory to be of universal applicability, not only for biology but also for psychology and philosophy. Surely, then, his results would become even more meaningful, and even more acceptable, if they could be made quantitative. Thus, he reasoned, if heliotropisms are forced movements, caused by an inequality of muscle tensions which are related to chemical reactions occurring in the eyes, then they should be in agreement with the Bunsen-Roscoe Law which states that the total photochemical effect (E) produced by light is proportional to the product of the intensity of illumination (i) and the time of exposure (t), or

$$E = K \cdot it,$$

where K is a constant dependent upon the wave length of light. In other words, weak light acting for a long time is the equivalent of strong light acting for a short time.

Loeb,[19] having an uncanny knack for choosing organisms that would "fit" his hypotheses, tested the validity of the Bunsen-Roscoe Law for the heliotropic movement of the hydroid *Eudendrium*. Specimens were placed 25, 37.5, or 50 centimeters from a constant light source. Exposure times of 10, 22.5, and 40 minutes, respectively, were predicted, in accordance with the Bunsen-Roscoe Law, for the three distances. The ratios of the percentage of hydroids bending toward the light for the three distances, then, should be as 1:1:1; the observed ratios were as 1.02:0.99:1.02. Loeb concluded that the Bunsen-Roscoe Law was valid for the heliotropic response of *Eudendrium*. Unfortunately, however, he overreached himself in interpreting his experiment; he speculated that the experiment outlined above, and others like it, showed "that the tropism theory not only allows us to predict the nature of animal reactions but also allows us to predict them quantitatively. Thus far the tropism theory is the only one which satisfies this demand of exact science."[20]

[18] Osterhout, *op. cit.* (n. 15).

[19] Loeb, Jacques, and Wasteneys, Hardolph. A reëxamination of the applicability of the Bunsen-Roscoe Law to the phenomena of animal heliotropism. *J. exp. Zool.*, 1917, 22, 187-192.

[20] Loeb, *op. cit.* (n. 1), p. 93.

It is not difficult, after reading the passages quoted above, to understand why Jacques Loeb did not want for critics. His most successful opponents were probably S. O. Mast[21] and H. S. Jennings.[22] For example, the former regarded as futile the application, without qualification, of the Bunsen-Roscoe Law to the tropism theory. Mast concluded from his work on insects that the law holds in all reactions provided the time factor is sufficiently short but does not hold for any case where the time factor is sufficiently long. In other words, to paraphrase Mast,[23] the orienting stimulus (light), in accord with the Bunsen-Roscoe Law, must yield a given amount of energy, that is, a threshold must be reached in the reacting organ. The orienting response is of the all-or-none type; it is not proportional in magnitude to the stimulus.

Of the many criticisms Mast levelled against the tropism theory of animal conduct, the following were especially cogent:

1. Some insects in flight turn dorsad or ventrad when they orient. Since these two surfaces are not symmetrical, orientation cannot be dependent upon balanced action in the sense organs and the wing muscles.

2. If fireflies are briefly illuminated from one side, they turn through the proper angle and proceed in total darkness toward the source of illumination. The retention of orientation in these insects is, therefore, not due to continuous equal action in the receptors on opposite sides.

3. The phenomenon of orientation in asymmetrical forms requires considerable modification of the tropism theory.

H. S. Jennings, probably the earliest critic of Jacques Loeb's tropism theory, stressed that orientation involved "trial-and-error." Loeb derived his main support from the movements of an animal towards a beam of light. Jennings, however, "demonstrated the occurrence of a number of reactions in Protozoa in which the direction of motion could not be related to the direction of the stimulus";[24] such reactions are undirected. Loeb admitted that much protozoan behavior would not fit his theory. He objected, however, to this behavior being called "trial-and-error"; he felt this terminology was only further anthropomorphism.

21 Mast, S. O. *Light and the behavior of organisms.* New York, John Wiley and Sons, 1911. 410 pp.

22 Jennings, H. S. *Behavior of the lower organisms.* 4th printing. New York, Columbia University Press, 1931. 256 pp.

23 Mast, S. O. Photic orientation in insects with special reference to the drone-fly, *Eristalis tenax* and the robber-fly, *Erax rufibarbis. J. exp. Zool.*, 1924, *38*, 109-205.

24 Fraenkel, *op. cit.* (n. 7), p. 43.

It is now generally agreed that there are directed reactions in which the animal does not go straight towards or away from the source of stimulation. According to the classification of Kuhn (as modified and translated by Fraenkel and Gunn[25]) these may be called "telotaxic"[26] or goal orientation reactions. Activity in these cases is not dependent upon balanced stimulation of two receptors. For example, a dragon fly with one eye blinded is able to locate its prey by direct flight; this reaction cannot be a tropism in Loeb's sense because it is not dependent upon balanced stimulation of both eyes. Similarly, an organism in proper tropistic balance as conceived by Loeb, when illuminated simultaneously by two lights of equal intensity, should orient towards the midpoint of a line drawn between the two lights. Yet, the mysid crustacean, *Hemimysis lamornei*, and the honey-bee, among other organisms, orient exclusively towards one of the two sources of stimulation, the other being continuously or temporarily disregarded.

There are many more criticisms of Jacques Loeb's all-embracing tropism theory of animal conduct; perhaps it will be possible, without belaboring the point, to discuss one more of considerable interest. Several authors have attacked the automaticity and rigidity of Loeb's mechanistic scheme of behavior. Von Buddenbrock[27] was particularly vehement in his criticism. He referred to Loeb as the "kind of investigator [to whom] the insignificant isolated facts are of no importance. His soaring mind desires universal recognition for the results of his achievement. The glittering *theory* is everything to him, the facts only its servant. If the fact does not suit, then it will be forced into . . . the theory. . . ." And then, at the end of his paper, after marshalling a great deal of evidence against the tropism theory, von Buddenbrock maintained that it is

> universally true that in all tropisms the fundamental movement is adaptively constructed, for the purpose of leading the animal toward or away from the source of energy. Loeb's attempt to refer the action of the lower organisms to chemo-physical processes should therefore be disregarded.

Not only is such a theory unfruitful, in von Buddenbrock's opinion, but it also leads to a shallow conception in biology "since it inclines to regard the whole problem as solved just as soon

[25] *Ibid.*, p. 317.

[26] The term *taxis* refers to the direct locomotory orientation of a motile animal. *Telotaxis* is orientation in the direction of the source of stimulation which occurs without balance.

[27] Buddenbrock, W. von. A criticism of the tropism theory of Jacques Loeb. *J. Anim. Behav.*, 1916, *6*, 341-366.

as the chemo-physical side is explained." Although not entirely original, this was a surprisingly modern view for 1916; one would wish, however, that it had been expressed in a bit milder terms.

A gentler critic was Russell (1938) who believed in the great practical value of the "causal-analytical" (= physico-chemical) method of attacking problems in the physical sciences and maintained[28] that this method was also of immense value when applied to living things. Yet he could not agree with the mechanists that this was the only scientific approach to the study of living things. On the contrary, he felt that the causal-analytical approach did not "allow for the possibility that animals are more than mere machines and that neither their actions nor their perceptions can be satisfactorily analyzed in physiological terms alone." To Russell there seemed to be no need to accept *a priori* the mechanistic method; the direct (observational) method of analyzing animal behavior seemed just as feasible.

But Jacques Loeb held tenaciously to his ideas, even in the light of overwhelming evidence against them. Fraenkel and Gunn[29] perceptively wrote, "it was perhaps unfortunate that he [Loeb] formulated his theory so early in his career, for he showed both stubbornness and vigor in defending it and refused to consider sound arguments against it." Loeb constantly maintained that the acceptance of his theory was delayed because of the failure of biologists to recognize the methods of physics as applicable to biological science because they treated the problem of animal behavior from the viewpoint of the psychologist rather than that of the physicist. As early as 1912, in a letter to a colleague,[30] Loeb wrote:

> The theory of heliotropism has been attacked repeatedly, but either by men who are not biologists, . . . or who are not accustomed to thinking in physico-chemical terms, like Jennings, or Mast. . . . I hope one day that I may be able to reply to these attacks, if it should be necessary. I am convinced that progress in this field of science lies in the direction of my work.

As the years passed, Loeb became increasingly incensed at "the biologists who are not accustomed to thinking in physico-chemical terms," especially at Mast. In 1915 Loeb wrote[31] he heard from Raymond Pearl, who knew Mast personally, that

28 Russell, E. S. *The behavior of animals.* 2d ed. London, Edward Arnold and Co., 1938. 196 pp. (pp. 9-14).

29 Fraenkel, *op. cit.* (n. 7), p. 8.

30 Letter to Dr. M. H. Baege, 3 October 1912.

31 Letter to Dr. F. W. Bancroft, 18 November 1915.

"he is neither a gentleman nor a scholar and is possibly fit for a position of janitor but not scientist." He advised his former student Bancroft to publish a refutation of Mast's errors. "Go into it fully," Loeb wrote,[32] "so you need not keep on fighting him." Again to Bancroft in 1916, this time in milder terms, "Mast is becoming a general nuisance."

Another reason why Loeb felt the acceptance of the tropism theory had been delayed has already been mentioned. The Aristotelian concern for universal causes, leading to a teleological explanation of behavioral phenomena, could not be considered scientific. Only when animal reactions were reduced to quantitative laws, expressible by mathematical formulae, and when the question of purpose was dropped, could such complicated phenomena as instinctive reactions be resolved. Von Buddenbrock was dismissed by Loeb as being an Aristotelian. No doubt Russell, and perhaps even present-day students of behavior, would be dealt with in the same way.

I think Jacques Loeb's crusade is best understood if one realizes that it was philosophically founded and deeply rooted in his humanistic approach to life. It was displeasing to Loeb, however, to be referred to in this light.

> My contributions [he wrote to W. F. Kellogg on 26 July, 1922] consist purely in physico-chemical experiments. I have never indulged in philosophical writings . . . philosophers and biologists who were not familiar with physical chemistry, and who were therefore not able to understand my experiments attacked them because they felt my results did not agree with the old fashioned philosophical, purely speculative views on instincts and will.[33]

But these contentions become less convincing if one probes a bit deeper into Loeb's background. Was his outlook on the tropism theory "purely" scientific or was it colored, in reality, by a search for universal causes?

Jacques Loeb was born in Germany on 7 April 1859, within a few miles of Strasbourg, in a region where French and German culture had long intermixed.[34] Shortly after his eighteenth birthday he enrolled in the Askanische Gymnasium in Berlin where he obtained a classical training. Subsequently, Loeb attended four German universities—Berlin, Munich, Strasbourg, and Würzburg; at the latter two the course of his future scientific career was molded. It was indeed a favorable time for a bright and industrious

[32] Letter to Dr. F. W. Bancroft, 2 March 1916.
[33] Letter to W. F. Kellogg, 26 July 1922.
[34] Flexner, Simon. Jacques Loeb and his period. *Science*, 1927, *n.s. 66*, 332-337.

young man to embark upon a university career, especially one with inclinations such as Loeb possessed, for the investigators in the German universities were engrossed in fundamental problems in physics, chemistry, and biology.

The French influence was equally pronounced in Loeb. His father, though a German citizen, had strong French sympathies and ideals; he is said to have hated Prussianism and to have "looked longingly towards the democratic institutions of France and the United States."[35] Loeb was subjected to the writings of Voltaire and the French Encyclopedists while still quite young; the influence of this literature on his outlook can be seen in his major works. Thus, according to Robertson,[36] underlying Loeb's lifetime of "diligence and unsparing expenditure of self" there was one central objective towards which all his endeavors were aimed, and its clue "is to be found in the literature of the Encyclopedists."

The Encyclopedists held that human nature is not basically evil but on the contrary it is basically good. Thus they maintained by proper education, by attainment of freedom from religious dogma and superstition, and by the exertion of individuality, man could rise above his lowly state and could make the world a desirable place in which to live. "All would be well in this world," the Encyclopedists wrote, "if it were not for the faults of education and environment, created by false beliefs, mistaken prejudices, and the domination of ignorant and selfish despots."[37]

It has been said[38] that Holbach, of all the Encyclopedists, exerted the greatest influence on Jacques Loeb, for he attempted to apply science to the solution of human problems. It follows, then, that Loeb would apply that science which seemed most useful to him — mechanistic science — to the solution of human problems. His aim was to strip away the mystery and ignorance, by which oppressive dogmas came to be accepted, and to show that living organisms are machines impelled by physical and mechanical forces.

W. J. V. Osterhout,[39] Loeb's distinguished student, has written: "Faith in mechanism became the religion to which he devoted his life. . . ." And again:

35 Osterhout, *op. cit.* (n. 15).
36 Robertson, T. B. The life and work of a mechanistic philosopher: Jacques Loeb. *Sci. Progr.*, 1926, *21*, 114-129.
37 *Ibid.*, 1926.
38 *Ibid.*, 1926.
39 Osterhout, *op. cit.* (n. 15).

If we realize that the great driving force of his life lay not only in a powerful intellectual urge, but also in a profound emotion we may better understand his zeal and why he attacked most eagerly the subjects where mysticism was most strongly entrenched. No matter how great the difficulty he seemed *determined,* as far as possible, *to reduce everything to mechanism* and his courage was often justified by startling success.[40]

With this predisposition toward the mechanistic writings of the French philosophers, Loeb fitted into the trend current in the German universities of his youth, that is, the application of physico-chemical methods to the solution of scientific problems. After a semester each at the Universities of Berlin and Munich, Loeb entered the University of Strasbourg where he joined the laboratory of Goltz, a pupil of the great Helmholtz, who was then studying functional localization in the brain. There, Loeb's interest in brain physiology was nurtured and, after receiving his M.D. in 1884, he returned to Berlin as an assistant to Zuntz, where he continued his work on brain physiology. This interest in the brain was to serve him well in his later investigations of tropisms.

In 1886 Loeb became an assistant to Fick at Würzburg, whose laboratory had made significant contributions in the field of physical physiology.[41] But far more important to the young scientist was his chance association with the botanist, Julius Sachs, whose discoveries dominated the field of plant physiology between 1857 and 1890. Of interest to Loeb was Sachs's ability to control the movement of plants by light, chemicals, and gravity; Sachs called these plant movements tropisms. Loeb's alert mind saw a parallel between these phenomena and the supposed instinctive movements and behavior of animals. Here was an area where, if he could control animals as Sachs controlled plants, the problem of will could be attacked scientifically. Thus in Fick's laboratory, but under the guidance of Sachs, Loeb began his famous experiments on the heliotropism of the caterpillar referred to above.

In the fall of 1888 Loeb returned to Strasbourg to resume his work with Goltz. The new interest in animal tropisms, however, could not be forgotten; in order to pursue these studies further he spent the winter months from 1889-1890 at the Naples

[40] Italics mine.

[41] There seems to be some confusion about this period in Loeb's career. Flexner and Osterhout maintain that Loeb spent from 1886-1888 as an assistant to Fick at Würzburg, returning to Goltz' laboratory in the fall of 1888. Robertson holds that the period (1886-1888) was spent with Goltz at Würzburg, and that the preceding aud succeeding years were spent at the University of Strasbourg with Fick. Most authors are in agreement with Flexner and Osterhout.

Zoological Station where invertebrate material could readily be obtained. At Naples Loeb met several American biologists. One of these, the anatomist F. P. Mall, obtained for him a position in America at Bryn Mawr College.[42] Loeb remained at Bryn Mawr until, in January 1892, on an invitation from C. O. Whitman, he moved to the University of Chicago. The lure of having marine material available all the year round helped, in 1902, to entice Loeb to the University of California. By 1910 he was anxious to return East where he could have more contact with fellow scientists and would be able to spend summers at the Marine Biological Laboratory. When the call to the Rockefeller Institute came, Loeb, who considered "a research position" his "ideal,"[43] accepted. He remained at this last position until his death in 1924.

Loeb had an amazing capacity for productive research. The bronze tablets erected to his memory at the Marine Biological Laboratory, where he spent most of his summers, and at the Rockefeller Institute, give a partial list of his accomplishments. They read:

Jacques Loeb
1859-1924
Brain Physiology
Tropisms, Regeneration
Antagonistic Salt Action
Duration of Life
Colloidal Behavior

Simon Flexner,[44] in a 1927 tribute to Jacques Loeb, summed up the man well by saying: "Taken in all, physical chemistry constituted for Loeb the bright silken thread on which are strung the brilliant beads of his discoveries." In fact, physical chemistry, intermixed with mechanistic philosophy, permeated every aspect of Jacques Loeb's being, in and out of the laboratory. In retrospect, it seems unfortunate that he was not more successful in compartmentalizing his contributions. It is clear that he considered his philosophy to be separate from his science, but given the man, the temper of the times, and the intense humanism which characterized his entire life, Loeb could hardly have been truly

42 Loeb, Leonard B. Jacques Loeb: Recollections of his career as a scientist. *Rockefeller Inst. Quart.*, 1959, *3*, 1-4, 6.
43 Letter to Dr. Simon Flexner. Quoted in: Osterhout, *op. cit.* (n. 15).
44 Flexner, *op. cit.* (n. 34).

objective. His critics were harsh, no doubt because they could not understand the man, and also, perhaps, because they realized that strict adherence to a mechanistic conception of life would impair the progress of biology.

Loeb expressed over and over again his views on social institutions; he believed that the results of his researches were applicable to the totality of human affairs and conduct. To him human existence was

> based on the play of blind forces and only a matter of chance. . . . Instincts [= tropistic behavior] are the root of our ethics and . . . are just as hereditary as is the form of our body. We eat, drink, and reproduce not because mankind has reached an agreement that it is desirable to do so, but because, machine-like, we are compelled to do so. . . . The mother loves and cares for her children, not because metaphysicians had the idea that it was desirable, but because the instinct of taking care of the young is inherited just as distinctly as the morphological characters of the female body. . . . Economic, social, and political conditions or ignorance and superstition may warp and inhibit the inherited instincts and thus create a civilization with a faulty or low development of ethics. . . . Not only is the mechanistic conception of life compatible with ethics: it seems the only conception of life which can lead to an understanding of the source of ethics.[45]

It may be difficult to believe that a man who maintained that humans were "machine-like" and that only the mechanistic conception could lead to an understanding of ethics could have a genuine regard for suffering humanity. But Loeb's writings from 1915 up to his death contained numerous references to the sorrows of war, and what could be done to alleviate them. For example, in an article entitled "Biology and War," he wrote that if statesmen were familiar with exact science and were willing and capable of applying the results of exact science to the intellectual, moral, physical, and economic uplifting of the masses, the danger of war would be eliminated.[46] In addition, a partial list of organizations in which Loeb was active during the war years will surely remove the notion that he was not a great humanist. He was a member of the following groups: The Emergency Peace Federation, The American Neutral Conference Committee, The American League to Limit Armaments, The Society to Eliminate Economic Causes of War, and The American Friends of German Democracy.

[45] Loeb, Jacques. *The mechanistic conception of life*. Chicago, University of Chicago Press, 1912. 232 pp. (p. 31).

[46] Loeb, Jacques. Biology and war. *Science*, 1917, *45*, 73-76.

In the years after the War, Loeb was active in trying to rehabilitate European scientists. To many of these scientists he sent cash gifts, others he helped establish in positions in the United States, and for still others he organized fund-raising campaigns. Pavlov, the Russian physiologist, was a beneficiary of one of these campaigns. Loeb saw to it that the *Journal of General Physiology,* of which he was one of the editors, was sent free to every deserving institution which could not afford to pay the subscription.

Jacques Loeb considered racial prejudice to be "oppression by a parasitic minority,"[47] and wrote for *The Crisis,* the magazine of the National Association for the Advancement of Colored People. In 1914, in an article "Freedom of Will and War,"[48] he attempted to apply tropistic ideas to history. And finally, lest we belabor our point, Loeb attended meetings with Albert Einstein, Louis Brandeis, and others, in order to discuss the desirability of establishing a Hebrew University in Jerusalem. Typically, in a letter to Brandeis[49] discussing the proposed university, Loeb wrote that it would be well to begin with the development of physics and chemistry, because the sciences depending upon these "fundamental sciences" (for example, biology, pathology, and medicine) would not have a chance "if there exist no thoroughly modern and well-equipped laboratories of physics and chemistry." Thus, Jacques Loeb was truly dedicated to a mechanistic philosophy, in and out of the laboratory. Indeed, looking back at Loeb the philosopher and Loeb the scientist, one can almost certainly see that it was probably impossible for him to separate the two great driving forces of his life; the subjective and the objective were so thoroughly intermeshed that they were thought of as a unity.

But Loeb always insisted that all his observations were purely objective. It is clear, however, that his search for universal truths underlying animal behavior led him to unwarranted generalizations: all oriented movements are tropisms or combinations of them and all behavior is composed of tropisms. An attempt has been made in this essay to indicate that there are other types of oriented behavior; some of these were noted by Loeb's contemporaries (Mast and Jennings, for example), many others have been subsequently described. To Loeb's everlasting credit, however, is his insistence upon the removal of anthropomorphic state-

47 Loeb, Jacques. Science and race. *Crisis,* 1914, *9,* 92-93.
48 Loeb, *op. cit.* (n. 10).
49 Letter to Justice Louis D. Brandeis, 6 January 1921.

ments from behavioral literature, his realization of the difference between reflex ("tropistic") movement and purposive or directed behavior and, perhaps most important, his stimulation of a great many students, colleagues, and critics, to devote themselves to an analysis of behavior.

Loeb could not accept the possibility that animal behavior might be more complex than he had proposed. His son, Dr. Leonard Loeb, has recently written[50] that even in his father's period, "Newtonian predictability and determinism were forced to give way to an inherent indeterminancy and thus unpredictability in detail, quite inconsistent with the mechanistic philosophy of the past." How seriously indeterminancy and the new quantum mechanics, as clearly expressed after Loeb's death, would have upset his mechanistic faith, with its humanistic implications, is hard to estimate. His son feels that "it is probable that he would have been content with the continued application of the physico-chemical approach."

Modern workers realize that the study of animal behavior is vastly more complicated than the tropism theory would permit. Tropism is just one limited aspect of the problem. In fact, the word, it may be recalled, was originally reserved for plant movements; it should never have been applied to animal, even less to human, behavior.

Currently, the study of animal behavior embraces many disciplines. Physiology, especially neurophysiology, and endocrinology are beginning to elucidate some of the mechanisms at work in an animal in action.[51] Ecologists, sociologists, and geneticists are investigating behavioral phenomena. Dominating all else, however, is the desire to understand how behavior evolved. Loeb, as suggested earlier in this essay, pointedly ignored evolutionary theory in his writings. He maintained that evolutionary hypotheses were not subject to experimental verification. But more importantly he probably felt "the modern world [would lose] that supreme confidence in the nature of man which the Encyclopedists avowed" on account of the evolutionary theory.[52] Loeb could not believe that bad human qualities could possibly have evolved; after all, was not the mechanistic conception of life the only route to ethics?

[50] Loeb, Leonard B., *op. cit.* (n. 42).

[51] Tinbergen, N. *The study of instinct.* London, Oxford University Press, 1951. 228 pp. (p. 2).

[52] Robertson, *op. cit.* (n. 36).

An anonymous author has written of *Forced Movements, Tropisms, and Animal Conduct*: "Loeb's book is all right if he wrote it with his tongue in his cheek; but if he really meant it, it is only nonsense."[53] I am persuaded that Loeb meant every word of it and equally that it was not nonsense. If Loeb had not stretched his hypotheses so far, and had not attempted to apply them where they obviously would not fit, his work would have been a greater contribution to studies in animal behavior and would have been regarded more highly.

Contemporary workers in the field of animal behavior generally hold, with Thorpe,[54] that

> both subjective and objective concepts are necessary in the scientific study of life, and that a biology which succeeds in being purely objective, however powerful it may be in parts of its field, must fail to provide a full biological philosophy—just as surely as a purely subjective biology would be unthinkable. In other words, subjective concepts derived from introspection are among the essential tools for the study of life, and the only hope for a complete biology is to combine the subjective and objective in the right proportions, using each approach with due circumspection and adequate safeguards as is required. All our concepts in whatever field are, of course, in the last resort subjective in that they are conscious expressions of our experience; but above all, we have to *beware of falling into the trap, which has so frequently ensnared past students of living matter, of supposing ourselves objective when, in fact, we are being subjective.*[55]

Clearly, Jacques Loeb fell into the trap. Perhaps he could not have done otherwise, and rather than be overly critical we should gratefully accept his voluminous contributions to scientific knowledge, forgiving him his humanistic philosophy. However, I have not suggested that we *forget* Jacques Loeb's philosophy, with its optimistic belief in the ultimate goodness of man. With the world in its present state, it might be well if more scientists, and others who shape opinion, had equally humanistic inclinations.

ADDENDUM

After this paper had been submitted for publication the author came upon an article, "Jacques Loeb, the Scientist. His Papers and His Era," by Nathan Reingold, appearing in *The Library of Congress Quarterly Journal of Current Acquisitions,* 1962, *19,* 119-130.

[53] This statement is attributed to a friend of Theodore H. Savory. See Savory, T. H. *Mechanistic biology and animal behaviour.* London, Watts & Co., 1936. 182 pp. (p. 102).

[54] Thorpe, W. H. *Learning and instinct in animals.* London, Methuen and Co., 1956. 493 pp. (p. 7).

[55] Italics mine.

John Graunt, Francis Bacon, and the Royal Society: The Reception of Statistics

ROBERT KARGON*

THE debut of a new and powerful method is a rare phenomenon in the history of science. One such debut, occurring in Restoration England, has been overshadowed by the achievements of Newton. Early in 1662 John Graunt, a London tradesman, inaugurated modern statistics through the publication of his *Natural and Political Observations . . . upon the Bills of Mortality.*[1] The past one hundred years have witnessed the flowering of Graunt's method in almost every area of scientific endeavor. The statistical approach, utilizing partial knowledge to reach more general judgments, has been refined, made precise and reliable. Its applications have stretched across the boundaries of the biological, physical, and social sciences. Statistics has become indispensable for scientific progress.

With the advantage of three centuries, the modern observer can review Graunt's achievement, seeing in it all its subtleties, portents, and potentialities. Graunt's contemporaries, however, could hardly have been expected to accord him the acclaim which he has earned through succeeding generations. Yet John Graunt was indeed honored and esteemed during his lifetime. Within two weeks of the publication of his *Observations,* Graunt was nominated for fellowship in the Royal Society, with, it is said, the expressed recommendation of King Charles II.[2] What interested his contemporaries in his work? Graunt produced a book which was remarkable for its useful and pertinent medical and social conclusions as well as for its novel and fertile method of analysis. It was for the former that Graunt was originally admired, rather than for the revolutionary tool which he had fashioned. The purpose of this paper is to examine the circumstances of the reception of the *Observations* and point out the largely medical nature of this reception.

* Department of History, Cornell University, Ithaca, New York.

I should like to thank Prof. Henry Guerlac for his very helpful counsel and suggestions concerning the state of science in seventeenth century England.

1 John Graunt, *Natural and political observations . . . upon the bills of mortality,* London, 1662.

2 Thomas Sprat, *History of the Royal Society,* London, 1722, p. 67.

I

On 5 February 1662, Dr. Daniel Whistler, physician and member of the Royal Society, brought before his fellows for consideration a slim, neatly bound volume.[3] The book, hardly more than a pamphlet, was written by Mr. John Graunt, a citizen of London and a reputable tradesman of that city.[4] Graunt became the center of considerable attention during the period immediately following the publication of his book. Dr. Whistler, at the 5 February meeting, distributed fifty copies of the work which Graunt had provided for the perusal of the members of the Society. After reading the dedication addressed to Sir Robert Moray, the president of the Society, Whistler proposed Graunt for membership.[5] This was an unprecedented honor for a largely self-educated Londoner. The Society included men of high rank and learning, but not a single tradesman.[6] Graunt's credentials, however, were reinforced by the interest which his observations had caused. King Charles himself is said to have added considerable weight to his application by urging that "if they [the Royal Society] found any more such Tradesmen, they should be sure to admit them without any more ado."[7] The question of why the Royal Society was so interested in Graunt's work may best be answered by a close investigation of his work and aims, and their relationship to those of the Royal Society.

Graunt's scientific interests first became fruitful when he turned his attention ("I know not by what accident")[8] to the Bills of Mortality, collected and published in London. The Bills of Mortality, or lists of the dead, were collected in London as early as 1527, and the British Museum possesses a Bill from 1532 which furnishes details of plague deaths in the city. The early bills said nothing of the cause of death, except when death was due to bubonic plague. In 1592, the bills were begun on a regular basis and included the causes of all deaths, with the number of christenings as added data. In 1603, after a serious epidemic of plague, the Bills were issued weekly.[9] The data for them were

3 Thomas Birch, *History of the Royal Society of London*, London, 1756, I, 75.

4 A controversy over the true authorship of the work still exists. Claims favoring the authorship of William Petty, however, are not convincing. Two excellent discussions of the problem are Major Greenwood, "Graunt and Petty," *J. roy. stat. Soc.*, 1928, *91*, 79-85, and Walter Willcox, "The founder of statistics," *Rev. inst. int. Stat.*, 1937, *5*, 8.

5 Birch, p. 75.

6 E. S. de Beer, "Earliest fellows of the Royal Society," *Notes Rec. roy. Soc.*, 1950, *7*, 172.

7 Sprat, p. 67.

8 Graunt, *Op. cit.* (n. 1), p. 3. The edition cited here and henceforth was edited by Walter Willcox, Baltimore, 1939.

gathered by *searchers,* who were generally elderly women, usually susceptible to bribes, ignorant of medicine, and often a bit intoxicated.[10] Their assignment was to investigate and report the deaths and to quarantine the diseased.[11] The searchers reported their findings to the Parish Clerks on Tuesdays, and by 10 a.m. on Thursday copies were issued for public sale at 1d. per sheet or by subscription at 4s. per year. It is unknown how the publication of the bills fared under the Commonwealth; the Parish Clerk's Registers before 1664 are missing, having been loaned to Graunt for his studies and never returned. It is known, however, that under Charles II the bills were regularly published, and attempts were made to improve them.[12] It was these Bills of Mortality, available to him dating from 1592, to which Graunt turned his attention. He claimed not to have been conscious of the factors originally drawing his attention to the Bills. His friend, John Aubrey, hinted that William Petty first suggested them to him.

> He wrote "Observations on the bills of Mortality very ingeniosely, but I beleeve and partly know, that he had his Hint from his intimate and familiar friend Sir William Petty."[13]

Graunt, however, later described it otherwise.

> Having been born, and bred in the City of London, and having always observed, that most of them who constantly took in the weekly Bills of Mortality, made little other use of them, then to look at the foot, how the Burials increased or decreased; And, among the Casualties, what had happened rare and extraordinary in the week currant: so as they might take the same as a Text to talk upon in the next Company; and withall in the Plague-time how the sickness increased or decreased, that so the Rich might judge of the necessity of their removall, and Tradesmen might conjecture what doings they were like to have in their respective dealings.
> Now I thought that the Wisdome of our City had certainly designed the laudable practice of takeing, and distributing these Accompts, for other and greater uses then those above mentioned, or at least some other uses might be made of them.[14]

Graunt's explanation is plausible, and in the absence of any reliable evidence to the contrary, greatest weight must be given to it. As a tradesman, Graunt was apt to be familiar with the bills, and as a man of thorough curiosity, having "an excellent working

9 Norman Brett-James, *Growth of Stuart London,* London, 1935, pp. 48-49.
10 They were, however, sworn before a justice of the peace.
11 Brett-James, p. 255. In *Romeo and Juliet,* Friar John is prevented from delivering Romeo's message by just such searchers.
12 Brett-James, p. 25. See also William Maitland, *History of London,* London, 1739, II, 533-534.
13 John Aubrey, *Brief lives,* O. Lawson Dick, Ed., Ann Arbor, 1957, p. 115.
14 Graunt, *op. cit.* (n. 1), p. 17.

head,"[15] it is far from unlikely that he reached these conclusions without the aid of a more learned gentleman.

The fundamental importance of Graunt's work lies in that he made the first contribution toward discovering regularities in medical and social phenomena. Moreover, he attempted to describe this regularity using what later came to be termed the "statistical method," and he has been justly termed the "Columbus" of this field.[16] The originality of his work must be emphasized; not only did he systematically assay the raw data which he discovered in the Bills of Mortality, but he employed hypotheses which he framed to predict new data.

The *Observations* opens with a discussion of the origins and evaluation of the bills from 1592 to 1662, and their method of collection. Graunt next evaluates the data offered by the bills concerning deaths. He concludes that in many cases the searchers are qualified to register the cause of death, but there are also many deaths which "are aptest to be confounded and mistaken."[17] Examining acute and chronic diseases, he finds that two in nine die of acute diseases, 70 in 229 of chronic disorders, and not one in 60 of "outward griefs" such as cancer, ulcers, broken bones, and leprosy. He finds that about 7 per cent die of old age.[18]

Graunt then examines several individual causes of death more closely, particularly focusing upon the reliability of the data concerning them. Few die of starvation, few are murdered, and death from lunacy is rare. The French Pox (syphilis) data are not to be trusted; the searchers are often induced by bribe or "the mist of a cup of ale," to enter it as consumption.[19] It is important to note that Graunt pays particular attention to the new disease, rickets. He finds that this disease is unlisted until 1634, and asks whether the disease suddenly appeared, or previously went by another name. Examining the data for similar diseases, he finds that rickets has been gradually replacing "livergrown" since 1634; before that date, rickets must have been largely described by that name, although it also appeared as "stopping of the stomach," and "rising of the lights."

London had witnessed four high mortality periods since 1592: 1592, 1603, 1625, and 1636. In 1603 and 1625, 25 per cent of the population was wiped out. The plague of 1603 lasted 8 years, and

15 Anthony à Wood, *Athenae Oxonienses,* London, 1721, p. 311.
16 Johann Süssmilch, *Göttliche Ordnung. . .* , Berlin, 1761, I, 57.
17 Graunt, *op. cit.* (n. 1), p. 29.
18 *Ibid.*, p. 37.
19 Graunt, *op. cit.* (n. 1) , p. 37.

that of 1636 lasted 12 years, but that of 1625, only one year. Graunt concludes that the sudden epidemic jumps cannot be due to the change in constitution of men's bodies (as was often held), but to a "change of the air."[20] He further shows that within two years after a great plague, London is repopulated, mainly through an influx of population from without. A comparison of seasonal mortality is made. Autumn is found to be the unhealthiest of seasons. Certain diseases are menaces the whole year: spotted fever, smallpox, and dysentery or "plague in the guts."[21] Graunt also sweeps away the superstition that plague comes in with the coronation of kings (eg. 1603, 1625), by pointing to 1660, in which the advent of Charles II brought no disease with it.

Graunt next turns to questions of population. The common opinion held that the population ratio was three females to one male. Graunt arrives at the startling conclusion that approximately a one-to-one ratio obtains. The exact ratio which he found was 16 males to 15 females. He further observes that there are about three deaths per year per 11 families; since there are 13,000 deaths per annum, assuming eight members per household, this indicates a population of about 381,000.[22]

He finally considers the question of calculating a mortality table. He had already concluded that of 100 conceptions about 36 die before the age of 6, and one survives to the age of 76. Graunt then looks for mean proportional numbers between 64 (the number remaining at age 6), and one (the number remaining at 76). Graunt supposed that mortality rates were independent of age over a long portion of life, an assumption which would have to be modified using additional data unavailable to him.

In sum, then, Graunt demonstrated with evident success certain regularities in medical and social phenomena when treated *en masse*. From these regularities, Graunt drew various political and social conclusions. With respect to the nascent science of statistics, Graunt discovered the regularities in births and deaths, in deaths due to specific causes and in certain areas; he formulated nearly correct sex ratios and population estimates. He supplied the physician of his day with a novel set of medical statistics and showed him how the hitherto neglected Bills of Mortality could be used to his advantage His mortality table, while crude, was the first attempt to organize data in this manner. The *Observations* supplied

[20] *Ibid.*, p. 48.
[21] *Ibid.*, p. 51.
[22] Harald Westergaard, *Contributions to the history of statistics*, London, 1932, p. 21.

facts where before there had only been conjecture. Sometimes Graunt overturned false opinion and superstition, sometimes reinforced popular suspicions, and always posed new and interesting problems. However, the novelty and power of the *method* far outweigh these immediate considerations. While the eighteenth century revered Graunt as the founder of statistics, his own generation, under the strong influence of Baconian empiricism, looked primarily to the new facts which he had added to the common fund of knowledge.

II

With respect to the goals of his scientific endeavors, John Graunt, like so many others of his time, was a close student of Sir Francis Bacon. Bacon's outlook regarding the prospect of science contained two elements. On the one hand, he looked to scientific activity to illuminate man's vista.

> In experience of every kind, first the discovery of causes and true Axioms is to be made, and light-bringing not fruit-bringing experiments to be sought for. . . . Seeing the light is itself more excellent and fair than its many uses are.[23]

On the other hand, Bacon exulted in the great benefits and useful facts in which science often results. He maintained, for example, that "Now the true and legitimate goal of the sciences is none but this: that human life be enriched with new discoveries and wealth."[24] Bacon is often unclear regarding the relative importance of science as a light-bearing or fruit-bearing activity. The point remains: Bacon stressed *both* aspects of science. Moreover, he was an experimental universalist; for him, the domain of experimental science extended over all aspects of human endeavor.

> It may also be asked . . . whether we speak of natural philosophy only or whether I mean that the other sciences, logic, ethics, and politics should be carried on by this method. Now I certainly mean what I have said to be understood of them all.[25]

Bacon's program, therefore, included these three points: (i) the extension of experimental learning to all human activity, (ii) the illuminating of natural phenomena to enrich man's understanding, and (iii) the enrichment of man's wealth through technology.

Following Bacon, Graunt's purpose was two-fold: to increase the number of facts available (natural history) and to benefit

[23] Francis Bacon, *Novum organum*, G. W. Kitchin, Tr., Oxford, 1855, pp. 108-111.
[24] *Ibid.*, p. 57.
[25] Francis Bacon, *Selected works*, New York, 1955, p. 536.

the state by supplying useful information for it. These two aims are presented in detail by Graunt in two epistles dedicatory, as well as in his preface and conclusions.

> The Observations . . . have fallen out to be both Political and Natural, some concerning Trade, and Government, others concerning the Air, Countries, Seasons, Fruitfulness, Health, diseases, Longevity, and the proportions between the Sex and Ages of Mankinde. All which (because Sir Francis Bacon reckons his Discourses of Life and Death to be Natural History; and because I understand yourselves [the Royal Society] are also appointing means how to measure the Degrees of Heat, Wetness and Windiness in the several Parts of His Majestie's Dominions) I am humbly bold to think Natural History also.[26]

The first of the two dedicatory epistles is addressed to John Robartes, the Lord Privy-Seal, a Privy Councillor and Lord of the Treasury. Graunt wished to supply factual information for Robartes which could be of use in the governance of London.[27] Graunt suggested that

> Although your Lordship's most excellent Discourses have informed me that your Lordship is no stranger to these positions; yet because I knew not that your Lordship had ever deduced them from the Bills of Mortality, I hoped it might not be ungrateful to your Lordship to see unto how much profit that one Talent might be improved. . . . I did make bold to let your Lordship and the world see the wisdom of the City in . . . keeping these Accounts.[28]

To the members of the Royal Society, in his second dedicatory epistle, addressed to Sir Robert Moray, Graunt presented his other aim. Having already placed the applied science of his work at the disposal of the Crown, he now wished to have it examined upon its merits as an addition to experimental learning. Graunt, however, regarded his work not as novel methodologically, but as adding to the store of natural facts.

> I have presumed to present this Pamphlet so far as it relates to Government, and Trade, to one of His Majestie's Peers, and eminent Ministers of State, so I do desire your leave to present the same unto You also as it relates to Natural History, and as it depends upon the mathematiques of my Shop-Arithmetique.[29]

Graunt wished the Royal Society to look upon his work as a "Freeholder's Vote for the choosing of . . . the Parliament of Nature."[30] He systematically and conscientiously attempted to carry out

[26] Graunt, *op. cit.* (n. 1), p. 6.
[27] Graunt, *op. cit.* (n. 1), p. 4.
[28] *Ibid.*, pp. 4-5.
[29] *Ibid.*, pp. 6-7.
[30] *Ibid.*, p. 8.

Bacon's program: to extend the new learning to new areas, to illuminate even a small part of nature, and to serve a useful purpose.

III

The same "Baconian spirit" which guided John Graunt influenced the goals and practices of the Royal Society. The Society's general outlook upon natural problems—again two-fold—demonstrates not only tremendous enthusiasm for and faith in the new experimental approach to knowledge, and the extension of such learning to all fields, but also, as Bacon had additionally emphasized, enthusiasm for applying the truths discovered for the benefit of men. Sprat epitomizes the Society's goals:

> Their purpose is, in short, to make faithful Records of all the Works or Art which can come within their reach . . . to put a Mark on the Errors which have been strengthened by long Prescription; to restore the Truths that have lain neglected; to push on those, which are already known, to more varied Uses; and to make the way passable, to what remains unrevealed. This is the Compass of their Design.[31]

To root out superstition by finding new truths, and to put them to good purpose, were the functions of the Royal Society as the members saw them, and as John Graunt perceived them.

Did the Royal Society receive the *Observations* for the clarity and power of its method, for the utility of its conclusions, or for both? The Society did indeed receive the work favorably.[32] Graunt's book was published during the last week in January 1662. He was nominated by Whistler on 5 February. According to the rules of the Society, no person below the rank of baron was to be admitted without scrutiny, and not on the same day proposed.[33] A committee was appointed by Moray on 12 February to examine the book,[34] and on the 26th of February, Graunt was elected a fellow of the Royal Society.[35]

The Royal Society, having a large proportion of physicians in its membership, received the *Observations* primarily for its medical data. A large proportion of the book is devoted to the causes and effects of disease in London and its suburbs. For example, Graunt pointed out that rickets first appeared by that name in 1634, and that its occurrence was rising. He also included

31 Sprat, p. 161.
32 Sprat, p. 67. Cf. Robert Merton, "Science and technology in 17th century England," *Osiris*, 1938, *4*, 387.
33 Birch, I, 5.
34 *Ibid.*, I, 76.
35 *Ibid.*, I, 77.

in his book an interesting table of notorious diseases and the tolls they take.[36] Information of this nature would certainly interest the physicians of the Society who constituted approximately one-third of the membership at the time of Graunt's election.[37] A large number of papers presented to the Society were devoted to medical and related problems, and the medical aspect of Graunt's work was very much in keeping with the tone of the Society.

The interesting facts concerning rickets were of particular moment. In 1645, Daniel Whistler, M.D., presented his dissertation at Leyden entitled "De Morbo puerili Anglorum, quem patrio idiomate indiginæ vocant *The Rickets*," or "Concerning the Disease of English Children which in the native idiom they call the Rickets"—the first printed book on the subject. In it Whistler suggested the name "Pædosplanchnosteocaces" for the disease.[38] For obvious reasons it never became widely adopted. In 1650 Francis Glisson, along with George Bate and Assuerus Regemorter, published the definitive work on the disease, *De Rachitide*.[39] Glisson's work attracted much attention and excited a great deal of interest within the medical profession.[40] John Mayow and Armand de Boot later published works dealing with the disease.

Daniel Whistler was the member of the Society who nominated Graunt for fellowship. Glisson and George Bate were both members of the Society at this time. The committee appointed by the president, Sir Robert Moray, which was to scrutinize the book, indicates the importance attached to its medical aspects. The members (five physicians and a divine with broad scientific interests) were Sir George Ent, Jonathan Goddard, J. Needham, and Daniel Whistler, all M.D.'s, and John Wilkins, D.D.

Sir Robert Moray became interested in the *Observations* and sent a copy of the work to his friend, Christian Huygens, with whom he had been carrying on a mutually fruitful exchange of letters—Moray imparting to Huygens the latest news of English scientific advances and Huygens, the most capable continental scientist of his day, repaying the Society with his counsel and

36 Graunt, *op. cit.* (n. 1), p. 31.
37 E. S. de Beer, *op. cit.* (n. 6), p. 178.
38 Cecilia Mettler, *History of medicine*, Philadelphia, 1947, pp. 720-721.
39 Norman Moore [*St. Bart's Hop. Rep.*, 1884, 20, 21] maintains that Whistler received all his information from Glisson.
40 J. Baas, *Outlines of the history of medicine and the medical profession*, New York, 1889, p. 510.
41 Birch, I, 76.

prestige and often enhancing their Proceedings with his own scientific output.[42] Moray appeared to be particularly intrigued by the utility of Graunt's work and advocated the collection of similar information on the continent. In a letter to Huygens, only five weeks after the initial appearance of the *Observations,* he discussed Graunt's work and remarked that it contains "some things which could be very useful."[43] Huygens apparently placed the book aside for future consideration and turned his attention toward other matters. On 6 May 1662, Moray, impatient, sent a second letter to Huygens, reminding him of the work.

> It is true that I have been waiting for several words of reflection from you about these Observations of Monsieur Graunt. I believe that you will not be at all dissatisfied with them. If one took an account in all the cities of Europe *of the diseases of which people die,* along with the other things which are observed in the Weekely Bills of Mortality, which they have been [collecting] in London for several years . . . it would be a thing of great utility in several regards.[44]

The emphasis which Moray places upon disease is not surprising. In the chapter on particular causes of death, Graunt presented interesting quantitative information not yet known to the physician. In view of Moray's own medical interests,[45] one might expect him to view it in this light. He was familiar with the work of Van Helmont and Borelli and was particularly interested in the quantitative aspects of medicine.[46] He himself had constructed an instrument to measure pulses[47] and had presented to the Society "an engine for hearing" of his own device.[48]

In 1665 Graunt's *Observations* were reprinted by the Royal Society upon the suggestion of Sir William Petty.[49] The 1665 edition has a curious alteration of title which sharply reflects the view of the Society toward the work. The full title of the 1662 edition was:

> *Natural and Political Observations Mentioned in a following Index and made upon the Bills of Mortality . . . with reference to the Government, Religion, Trade, Growth, Ayre, Diseases and the several Changes of the said City.*

42 Sprat, pp. 127-128.
43 Letter, Moray to Huygens, 16 March 1662, in Christian Huygens, *Oeuvres complètes,* The Hague, 1888-1905, IV, 913. Hereafter cited as Huygens, *Oeuvres.*
44 Letter, 6 April 1662, in Huygens, *Oeuvres,* IV, 130. Italics supplied.
45 Alexander Robertson, *Life of Sir Robert Moray,* London, 1922, p. 183.
46 *Ibid.,* p. 184.
47 *Ibid.,* pp. 183-185.
48 Birch, I. 66.
49 *Ibid.,* II, 57.

The 1665 edition, however, has the revealing title:

Reflections on the Weekly bills of Mortality for the Cities of London and Westminster, and the places of adjacent: but more especially, so far as it relates to the plague, and other most mortal diseases that we Englishmen are most subject to, and should be most careful against, in this our age.

The shift from social-political emphasis in the first edition to a specifically medical one in the second is further evidence of the particular attention accorded its medical features. It should be noted that suggestion of re-publication was made prior to the serious outbreak of plague in the summer and fall of 1665.

IV

It was not William Petty or Robert Moray, but rather Christian Huygens who first saw the novelty and power of Graunt's method.[50] After a long delay, Huygens finally replied to Moray:

I thank you very much for the other two books, of J. Graunt and . . . of Monsieur Wallis. The discourse of Grant [*sic*] is very worthy of consideration and pleases me very much; he reasons clearly, and I admire how he prudently drew all these consequences from the Bills of Mortality which up until now were useless.[51]

Although Huygens was thus impressed with Graunt's approach, he did not, however, pursue his consideration of Graunt's work for several years. In August 1669 Christian's brother, Lodewijk, reported that he had ". . . made a table recently, showing how many persons remain living at all ages. It is a consequence which I have drawn from the table of the English book of the bills of mortality, a copy of which I am sending to you here."[52] The book to which Lodewijk Huygens referred was Graunt's *Observations*. This served to revive Christian Huygens' interest. He criticized Lodewijk's calculation and began to apply himself to reasoning with Graunt's table.[53] For the first time the theory of probability was applied to statistics, for Huygens had already been working with mathematical probability. Through the use of Graunt's table,

[50] G. N. Clark [*Science and social welfare in the age of Newton*, Oxford, 1949, p. 185] claims that Graunt's innovation "was *partus temporis*." It should be noted that William Petty first turned his attention to "political arithmetic" in 1682 [*Petty papers*, Lansdowne, Ed., London, 1927, II, 259 ff.] and never fully grasped the full import or technique of Graunt's method. See Walter Willcox, "Introduction" to Graunt's *Obervations*, p. x.

[51] Letter, Huygens to Moray, 9 June 1662, in Huygens, *Oeuvres*, IV, 149.

[52] Letter, Lodewijk to Christian Huygens, 22 August 1669, in Huygens, *Oeuvres*, VI, 483.

[53] Letter, Christian to Lodewijk Huygens, 28 August 1669, *ibid.*, 484.

probability theory was applied to social phenomena for the first time in any positive fashion.

Those who were interested in Graunt's *Observations,* like Moray and his fellow members of the Royal Society, were primarily intrigued by the fascinating factual information which Graunt had brought to light. Thus Christian Huygens was the first not only to apply and carefully reason with Graunt's innovation but also to appreciate fully the intrinsic merits of the approach. He linked the new probability theory to a statistical approach and thus anticipated a potent combination in future generations.

Podagra by Gottfried Rogg: An Illustrated Encomium on the Gout

THOMAS G. BENEDEK* and GERALD P. RODNAN**

WHILE both the belief that gout is a consequence of venery, gluttony, and drunkenness and the humorous treatment of this concept can be traced to ancient Roman authors, the literary flowering of gout reached its peak in the sixteenth and seventeenth centuries. The literature of this period employed a form derived from works of such Greek authors as Isokrates (4th century B.C.) and Lucian (2d century A.D.), which in essence resumed its evolution after the long hiatus of the Dark Ages. This form may be called didactic irony. It developed in two closely related styles: one was the "Fools Literature," which endeavored to teach by showing how people are victimized by their own weak and foolish behavior.[1] The other, which relates more directly to certain ancient Greek writings, is the encomium.[3] [a] These tracts utilized facetious praise of the subject being attacked and often employed allegory.

The four principal subjects of encomia were notorious persons, disdained animals (fleas and flies, for example), various sins and vices, and disease. Of the vices the most popular was drunkenness, and of the diseases, gout—subjects which were easily related.[b]

Perhaps the most famous of the encomia, which does not pertain to disease, however, is *Encomium moriae (In Praise of Folly)* by Desiderius Erasmus of Rotterdam, first published in 1509.[2] This is clearly derived from the German work, *Das Narrenschiff (The Ship of Fools)* by Sebastian Brant, the first edition of which appeared in 1494.[5] These two volumes, that of Brant in verse and of Erasmus in prose, became the basis of a large literature.

* Pittsburgh Veterans Administration Hospital.
** Department of Medicine, University of Pittsburgh School of Medicine.

[a] Encomium: in a revel (celebration); a eulogy.

[b] Some of the more popular and widely quoted gouty encomia were the following:
Willibald Pirckheimer, *Apologia seu podagrae laus*, Nürnberg, 1522, Latin prose.
Johannis Carnarius, *De podagrae laudibus oratio* (lecture at University of Padua, 13 November 1552) published 1553, Latin prose.
Hieronymus Cardanus, *Podagrae encomium*, Basel, 1562, Latin prose.
Johann Fischart, *Das podagrammisch Trostbüchlin*, Strasbourg, 1577, German prose and poetry.
Georg Fleissner, *Ritterorden des podagrischen Fluss*, 1591, German epic poem.
Jakob Balde, *Solatium podagricorum*, Munich, 1661, Latin poetry.

Although some gouty encomia, such as those of Fischart and Balde, contained incidental illustrations, few were primarily pictorial. We present here a copperplate engraving entitled *Podagra* by Gottfried Rogg (1669-1742) of Augsburg, Bavaria (Fig. 1), an unusually elaborate illustrated work, which has some of the features of the modern satirical comic strip. It is in a textual setting typical of an encomium. Rogg was a draftsman and publisher as well as an engraver. This undated engraving appears to have been his only work pertaining to a disease.[4] [c]

The central illustration shows a well-dressed gentleman with a cane who is standing in his bedroom and pointing to a table on which stand ointment jars, spatula, and bandages. His feet are swathed in gout-stockings. The name of the sufferer, inscribed in the scroll at the bottom, is *Ciprian Schmerzfelder von Keuckenberg. Ciprian,* his given name, like the related term *Zipperlein,* was a common designation for gout in sixteenth century German. His family name is a play on the words *schmerz* (pain) and *keuch* (gasp or wheeze). The twenty small illustrations which surround this picture each depict a virtue which is ironically attributed to the personified Podagra. A phrase or sentence which appears below each of these pictures is repeated in the lower portion of the page with some amplification. Following the twentieth epigram there is a poem which is an apology for the ravages caused by Podagra.

To the Strength, Usefulness, Virtue and Influence of
PODAGRA, most noble and most valued in the whole world

1. *The Podagra is a fashionable ailment.* Because he who is burdened by it does not run around all over town with other ambitious persons, but remains elegantly at home.

2. *It takes care of itself all alone.* Since it does not especially care about foreign things, having enough to do by itself.

3. *It is humble.* Because it attaches itself to the patients' feet.

4. *Wakeful.* Because it permits little rest or sleep.

5. *Moderate.* Because the patient is repelled by almost all foods.

6. *Temperate.* Because such a patient often drinks water rather than wine.

7. *Obedient.* In that one in this condition lets himself be greased, have incense burned, and have the feet bandaged.

[c] All of the known works of Rogg appeared between 1704 and 1732. *Podagra* was published by Albrecht Schmidt in Augsburg.[4]

1. Das Podagra ist eine modeste Kranckheit.
2. Es sieht auf sich ganz allein.
3. Es ist Demüthig.
4. Es ist Wachsam.
5. Es ist Mäßig.
6. Es ist Nüchtern.
20. Es ist Mayestätisch.
7. Es ist Gehorsam.
19. Es ist Liebreich.
8. Es ist Verschwiegen.
18. Es ist Weise.
9. Es ist Gedultig.
17. Es ist Gütig.
10. Es ist Verstandig.
16. Es ist Frumm.
15. Es macht Keusch und ewig reich
14. Es ist Keusch.
13. Es vertreibt dem Podagra die Gall
12. Es ist Schambhafftig.
11. Es ist Andächtig.

Krafft / Nutzen / Tugend / und Würckung deß in aller Welt
HochEdel und hochgeschätzten

P O D A G R A.

1. Das Podagra ist eine modeste Kranckheit.

DAnn der jenige / so darmit behafftet / lauffet nicht überall mit anderen neugierigen Personen in der Stadt herum / sondern bleibt fein zu Hause.

2. Es siehet auf sich ganz allein. Denn es bekümmert sich nicht sonderlich umb fremdde Dinge / indem es mit sich selbsten genug zu thun hat.

3. Es ist demüthig. Dieweil es sich an des Patienten Füße macht.

4. Wachsamb. Dann es läßt wenig ruhen oder schlaffen.

5. Mäßig. Sintemahlen ihm faßt vor aller Speise eckelt.

6. Nüchtern. Dieweil ein solcher Patient offt das Wasser vor den Wein trincket.

7. Gehorsamb. Indem man sich in dergleichen Zustand schmieren / räuchern / und die Füße einwickeln läßt.

8. Verschwiegen. Dann man seufftzet mehr / als man reden thut / indem einem alles Gespräch verdrüßlich fällt.

9. Es ist gedultig. Denn ein solcher Patient mag sitzen / liegen oder stehen / so ist er doch stets in Arbeit.

10. Verständig. Dieweil es alles das jenige meidet / woraus es entsprungen / und alles das jenige verwürfft.

11. Andächtig. Es lehret den Menschen beten / und seine Gedancken nach dem Himmel richten.

12. Schambhafftig. Dann wann es sich bey einem Patienten einstellt / suchet es derselbe / so viel als ihm möglich / zu verbergen / und unter dem Nahmen eines anderen Unfalls zu verstecken.

13. Es verhilfft dem Menschen zu dem höchsten Guth. Denn es zeiget ihn an / die Gebott des Himmels nach Möglichkeit zu halten / und bringet ihn endlich so weit / daß er sich dessen Besitz dermahlen einst gewiß getrösten kan.

14. Keusch. Sintemahl es sich nicht einmahl gerne anrühren läßt.

15. Es machet den Menschen reich an zeitlich- und ewigen Gütern. Indem es ihn von vielen Sünden abhält / es gehet ihn ab von allen Gastereyen / Gesundheit-Trincken / Tantzen / ohnnützlicher Liebe / und dergleichen / wordurch das Gebäu des Menschlichen Cörpers gleichsamb zerschüttert und baufällig gemachet wird / dahero dann öffters die gesunde Lebens-Tage durch so viele Unordnungen verkürtzet werden.

16. Es ist fromm. Denn es macht fromme Leuthe / und lehret recht andächtig leben / stifftet auch einen gewissen Stillstand mit der Sünde.

17. Es ist gütig. Dieweilen es seinen Patienten selten gänzlich verläßt.

18. Es ist weise. Denn indem es den Menschen peiniget / lehret es ihn / sich selbst erkennen / und andere zum Mitleiden zu bewegen.

19. Es ist liebreich. Denn es zihet die böse Dünste an sich / und verzehret die Feuchtigkeiten / reiniget den Leib sambt dem Haupt / und machet also bey dem Menschen eine gantz andere Natur / und erweiset also sein treue Dienste.

20. Es ist endlich auch Mayestätisch. Dann man ligt in dem Bette / als ein König auf seinem Trohn / man gehet niemand entgegen / man stehet vor niemand auf / man begleitet niemand / und endlich besucht man auch niemand / wenn man auch schon besucht wird.

DAraus ist Podagra ein hoch-erhobenes Wesen /
Und fordert dannoch nicht viel Kosten oder Speisen /
Dann es hält Haußhalten
Was man mit frischen Muth in manchem Tag verschlemmet /
Auf die nach jene list / ist jetzund nun gekommet /
Jetzt ist es aus.
Man spahret Kleider / Schuh / die Füß bedient ein Kissen /
Auch machet Ayer nicht verwundet das Gewissen /
Der Bachus schlaffe.

Der Zorn will sich zwar bey ihr noch blicken lassen /
Wann du mit kruder Hand sollt Saltz und Spattel fassen /
Ohn alle Krafft /
Gedult ! tröst dich mit dem / daß du im Himmel Orden /
Und ihrer Bruderschafft bist einverleibet worden /
Nur drauf Gedult /
Brauch Saltz und Schmertzen-Oel / schmier Rucken Füß und Hände /
Orack / was ein Anfang hat / sind seiner Zeit das Ende.
Du hasts verschuldt.

Fig. 1. Illustrated portion of encomium *Podagra*, by Gottfried Rogg. (From the private collection of Dr. Rodnan).

8. *Taciturn.* One sighs more than one reads, while all conversation becomes annoying.

9. *It is patient.* Because whether such a patient may sit, lie, or stand, it is a constant effort for him.

10. *Prudent.* As long as one avoids or discards all that from which it originates.

11. *Pious.* It teaches the person to pray and to direct his thoughts toward heaven.

12. *Shaming.* When it develops in a patient, he attempts, as much as possible, to conceal his illness and to masquerade under the name of another misfortune.

13. *It helps the person to the greatest virtue.* Because it stimulates him to abide by the commandments of heaven as much as possible, and finally brings him so far that he can derive a steady comfort from their possession.

14. *Chaste.* Since it does not even like to be touched.

15. *It enriches the person in temporal and eternal values.* In that it restrains him from many sins, it deters him from all feasts, toasts, dances, immoderate lovemaking, and so forth, whereby the structure of the human body becomes virtually shattered and decrepit, wherefore the healthy days of life are then frequently shortened by a great many disorders.

16. *It is devout.* Since it creates devout people, teaches them to live piously, and also brings about certain cessation of sin.

17. *It is faithful.* Because it seldom leaves its patient entirely.

18. *It is wise.* Since, in tormenting the person it teaches him to know himself and to move others to sympathy.

19. *It is loving.* Because it attracts the evil vapors unto itself, consumes the humours, cleanses the body including the head, and thus brings about quite a different disposition in the person, and so proves its faithful services.

20. *It finally is also majestic.* One lies in bed like a king on his throne, one goes to meet no one, one arises for no one, one accompanies no one, and one finally also visits no one, even when one has been visited.

Podagra therefore is a being sublime,
Yet demanding little compensation or fine
As it holds court.
What often one aggravates with courage renewed,
In various ways, at last is subdued.
It is finished.
One spares clothes and shoes, feet by a cushion are attended,
Nor is the conscience by love apprehended.

Bacchus sleeps.
Anger, to be sure, still may you command
When you grasp salve and spatula with a crippled hand,
Of strength devoid.
Patience! In this nobility take consolation,
And the fellowship into which you have gained initiation.
Remain but patient!
Use salve and analgesic oil, grease back, hands and feet;
Consider: what has a beginning in due time its end will meet.
You are to blame.

It is clear that Rogg subscribes to the view that the gout resulted from over-indulgence in eating, drinking, and venery, and that its cure lay in abstinence from these activities. One wonders why he and other encomiasts chose to present this lesson in this form. Perhaps by doing so they made their works more acceptable to the unhappy victims of the disease and more interesting to all.

REFERENCES

1. Benedek, T. G. Doctors and patients in "The ship of fools." *J. Amer. med. Ass.*, 1962, *181*, 236-242.
2. Erasmus, D. *The praise of folly*. Translated from the Latin with an essay and commentary by H. H. Hudson. Princeton, Princeton University Press, 1941.
3. Hauffen, A. Zur Litteratur der ironischen Enkomien. *Vjschr. Litt'gesch.*, 1893, *6*, 161-185.
4. Thieme, W. and Becker, F. *Allgemeines Lexikon der bildenden Künstler*, edited by H. Vollmer, *et al.* Leipzig, E. A. Seemann, 1934, vol. 28, pp. 516-517.
5. Zeydel, E. H. *The Ship of Fools of Sebastian Brant*. New York, Columbia University Press, 1944, pp. 228-229.

A Prohibition Problem: Liquor as Medicine 1920-1933

BARTLETT C. JONES*

> The verse we facetiously sang in local-option elections about the saloon, 'Don't you cry, you'll be a drug store bye and bye,' will become a reality.
> Oliver T. Remners (1921)

> [Beer] was not a tonic but it was Teutonic.
> Wayne B. Wheeler (1921)

JOKES about "medicinal whisky" have glossed over a persistent problem in liquor control and a difficult one for someone outside medical circles to comprehend. Some basic distinctions must precede any attempt to place the matter in perspective and discuss it. Alcohol is not, strictly speaking, a synonym for liquor. Pure ethyl alcohol may be distilled without producing liquor, but liquor does contain ethyl alcohol in varying percentages. There are also many other alcohols, such as methyl or wood alcohol. Spirituous liquors are not the only "spirits"; there is, for example, spirits of ammonia. During the Prohibition era, three families of liquors were commonly considered to have therapeutic properties. Beer, ale, stout, and porter were malt liquors; wine was vinous liquor; while whisky, gin, and brandy were spirituous liquors. Alcohol could be introduced into the body otherwise than by mouth and it had many external uses. This essay is, however, limited to the medicinal use of liquor taken by mouth. Some authorities stated that references to "alcohol" meant liquor unless specifically qualified. The same practice has been followed here.

For decades prior to 1920, prohibitionists and temperance advocates had argued that the widespread use of liquor as medicine hurt their cause.[1] Hospitals, in both Europe and America, tried to reduce their use of liquor or, sometimes, banned it altogether. "Drys" then popularized the achievements of these hospitals, along with any scientific findings which tended to discredit liquor as a medicine. It was universally agreed that the need for medicinal liquor had been sharply and steadily declining throughout the

* Sam Houston State Teachers College, Huntsville, Texas.

[1] See, for instance, Martha M. Allen, *Alcohol: a dangerous and unnecessary medicine*, Marcellus, New York, 1900.

half century before Prohibition.[2] About one-half of the 48 states had outlawed the prescription of medicinal liquor, although some of these states permitted the use of pure ethyl alcohol as defined in the United States Pharmacopoeia. A long-term dry objective was achieved in the decade prior to Prohibition when the ninth revision of the United States Pharmacopoeia deleted whisky and brandy for the first time since 1850.[3] In 1920, a writer in the *Journal of the American Medical Association* opposed the return of these liquors to the Pharmacopoeia to avert "a political landslide into the wet abyss."[4]

The Eighteenth Amendment, as interpreted by the Congress and the courts, gave the federal government the power to regulate various additional uses of alcohols to enforce the sanctions against liquors for beverage purposes. The Volstead Act contained a number of provisions concerning the prescription of liquor for medicinal use.[5] So long as these requirements were satisfied, medicinal liquor was not forbidden by the federal government; but neither was it guaranteed. States could still prohibit or further circumscribe its employment. Patent medicines with a significant ethyl alcohol content raised enforcement difficulties but were not considered liquors unless they were fit for use for beverage purposes. The relative merits of pure ethyl alcohol, as opposed to liquors, was a troublesome question. Even in research articles, it was sometimes not clear which was used. Some patients received both interchangeably. Some authorities claimed that pure ethyl alcohol was less palatable.[6] If it made little difference which was used, the persistent complaints against Volstead limitations on liquor dosage per patient appear meaningless. When the legal amount of liquor was exhausted, it could be supplemented with the pure ethyl alcohol formulas approved by the United States Pharmacopoeia.[7]

The first important controversy during the period concerned medicinal malt liquors. (Beer comprised over 90 per cent of the

2 See Oliver T. Osborne, *The principles of therapeutics*, Philadelphia, 1922, p. 243, and George B. Wallace, "Some considerations of the pharmacology and therapeutic value of alcohol," *Med. Rec.*, 1922, *101*, 49.

3 A useful short treatment of the place of liquor in the Pharmacopoeia is Francis Hathaway's "Alcoholic liquors in and out of the United States Pharmacopoeia," *Sci. Temp. J.*, 1921, *30*, 86-89.

4 Bernard Fantus, "The physician and prohibition," *J. Amer. med. Ass.*, 1920, *74*, 1144.

5 National Prohibition Act, 41 *U.S. Stat.*, 309-312.

6 See, for example, Albert E. Roussel, "Abstract of discussion," *J. Amer. med. Ass.*, 1925, *85*, 579.

7 A District Court Judge made this point when upholding Congressional limitations upon medicinal liquor prescriptions in 1924. See Price *vs.* Russell, 296 Fed., 267-268.

pre-Prohibition liquor traffic.) "Drys" completely dominated the hearings on this question before the House Committee on the Judiciary in 1921, with Andrew J. Volstead as chairman. At least ten witnesses represented dry organizations such as the Anti-Saloon League; the effective, organized opposition to Prohibition had not yet materialized, although individual "wets" did testify. They had no materials comparable to the statements signed by numerous doctors asking that the medicinal use of malt liquors be prohibited. The "drys" argued that malt liquor prescriptions would create a severe enforcement problem, that such liquors were not essential medicines, and that malt liquors had never been included in the United States Pharmacopoeia.[8] Several medical doctors were called by the "drys." A pediatrician of long standing denied the value of malt liquors for nursing mothers.[9] Harvey W. Wiley, well-known chemist and pure food crusader, and another doctor declared that malt liquors had no place in medicine and were not sanctioned by reputable authorities.[10]

The "wets" did not even present a united front. An attorney for Anheuser-Busch, formerly the largest producer of beer in the world, opposed medicinal malt liquors. He claimed that his firm stood for law enforcement, which would be impossible if medicinal beer remained legal. Further, his company's investment in near beer and malt tonic would be jeopardized. Beer was good for the sick, but Anheuser-Busch's cereal beverages were better.[11] According to the attorney, there was no excuse for the sale of medicinal beer. "If the patient needs alcohol, the physician can prescribe it. If he needs merely a tonic, he can get that without the alcohol."[12]

The only doctor urging the retention of medicinal malt liquors stressed their psychological effect, palatability, and value in treating cases of physical weakness or debility. Congress had no right to dictate the form in which alcohol, a legal remedy, could be prescribed; and, though beer was not included in the United States Pharmacopoeia, neither were fresh air and sunshine. He asked that Congress submit the matter to the next meeting of the

[8] U. S. Congress. House. Committee on the Judiciary, *Prohibition legislation, 1921; Hearings before the Committee . . . , Sixty-seventh Congress, first session, on H.R. 5033, May 12-13, 16-17, and 20, 1921*, Serial 2, Washington, 1921, pp. 9, 12-16, 26, 35, 316-325.

[9] *Ibid.*, pp. 99-104.

[10] *Ibid.*, pp. 97-99, 296-301.

[11] *Ibid.*, pp. 40, 46-47

[12] *Ibid.*, p. 46.

American Medical Association.[13] Wayne B. Wheeler, Anti-Saloon League official, tried to discredit this testimony by claiming that the New York County Medical Association had turned down a resolution introduced by the witness on this subject, and that the witness represented a private organization which had opposed numerous regulations dealing with narcotics and liquor.[14] Charles Taber Stout, a farmer with several occupations and a leader of the chemotherapists who allegedly cured disease in 24 hours with germicides, claimed that restrictions on liquor prescriptions deprived him of a fundamental natural right—the right to life. He opposed the abolition of medicinal beer but must have weakened his testimony by predicting the repeal of the Eighteenth Amendment within the year and stating, when asked if he had practised medicine, "No; but I have been directing physicians how to practise."[15] The Committee reported overwhelming evidence "that beer has never been recognized as a medicine."[16] Medicinal malt liquors were outlawed in November 1921.[17]

By 1924, when hearings were held on legalizing beverages with a maximum alcoholic content of 2.75 per cent by volume, the "wets" presented a more effective defense of the medicinal value of malt liquors. A doctor delivered a comprehensive statement of the therapeutic uses of beer.[18] A congressman, also a physician, quoted two professors of medicine who gave malt liquors an honorable place in their respective textbooks on therapeutics.[19] With exceptions, malt liquors continued to be recommended throughout the Prohibition era for convalescence, improving the appetite, neurasthenia, senile decay, malnutrition, lowered vitality, digestive ailments, and wasting diseases. They were also recommended for nursing mothers.

Various malt liquor interests challenged the 1921 Act, but Congress was vindicated by the Supreme Court in June 1924. The appellants argued that: "The Eighteenth Amendment did not clothe Congress with the general power to invade the domain of medical authority, or to substitute its judgment for the judgment

13 *Ibid.*, pp. 58-67.
14 *Ibid.*, pp. 314-315.
15 *Ibid.*, pp. 142-145.
16 *Legislation supplemental to the National Prohibition Act*, 67th Congress, first session, House Report 224, Serial 7920, Washington, 1921, p. 2.
17 An Act Supplemental to the National Prohibition Act, 42 *U.S. Stat.*, 222.
18 U.S. Congress. House. Committee on the Judiciary, *Proposed modification of the Prohibition Law to permit the manufacture, sale, and use of 2.75 per cent beverages, Hearings . . . Sixty-eighth Congress, first session, April 21 . . . June 4, 1924*, part 1, Serial 39, Washington, 1924, p. 102.
19 *Ibid.*, part 2, p. 557.

of the attending physician"; "The determination of questions of fact is a judicial not a legislative question"; and, claiming an invasion of state power, the effect was "to strike the words 'for beverage purposes' from the Amendment."[20] These arguments fitted into the strict construction tradition. A unanimous Court upheld the Act, employing the doctrine of implied powers. The decision held that Congress had acted on ample evidence in concluding that malt liquors had no substantial medicinal value, a verdict which the Court appeared to accept as fact.[21] Outlawing medicinal malt liquors was, therefore, a legitimate enforcement measure.

A second focal point for the dispute over medicinal liquor in the early twenties was the internal struggle within the American Medical Association. The A.M.A. had taken a strong anti-alcohol stand in 1917, which was said to have been an important factor in the achievement of Prohibition.[22] Unlike the American Therapeutic Society which resolved that "alcohol has a proper place in the treatment of disease," the *Journal of the American Medical Association* maintained a rigid dry position through the early months of Prohibition.[23] To assist enforcement efforts, physicians were urged editorially to refrain from taking out liquor prescription permits in states where such prescriptions were legal. The *Journal* quoted an Anti-Saloon League study which showed that only 29 per cent of the nation's physicians, legally able to do so, had taken out federal permits to prescribe liquor. The editorial continued: "Evidently the remaining 71 per cent do not regard whisky as of enough value in the practice of medicine to go to the trouble of taking out a permit."[24]

The turning point in the A.M.A.'s attitude apparently was the publication of the results of a referendum on medicinal liquor conducted by the *Journal*. Over one-third of all the physicians in the United States were polled and 21.5 per cent of all physicians

20 Everhard's Breweries *vs.* Day, 265 U. S., 547-548.

21 *Ibid.*, pp. 558-562.

22 The resolution called beverage alcohol "detrimental to the human economy" and declared that its use in therapeutics as a tonic, stimulant, or food had "no scientific basis." The A.M.A. therefore opposed beverage alcohol and resolved that the therapeutic use of alcohol "should be discouraged." The importance of the resolution in the achievement of Prohibition has been stressed by Cora F. Stoddard, "How prohibition came to the United States," *J. soc. Hyg.*, 1920, *6*, 35, and Andrew Sinclair, *Prohibition: The era of excess*, Boston, 1962, p. 61.

23 The resolution of the American Therapeutic Society, apparently passed in either 1920 or 1921, was quoted in House judiciary hearings, *op. cit.* (n. 18), part 2, p. 560. "The easiest way," *J. Amer. med. Ass.*, 1920, *75*, 250; "Prohibition and professional honor," *ibid.*, 1921, *76*, 1503.

24 "Medicinal use of whisky," *J. Amer. med. Ass.*, 1921, *76*, 524.

answered.[25] The doctors were asked, among other things, whether they considered whisky, beer, and wine "necessary" therapeutic agents in the practice of medicine. A bare majority replied that whisky was necessary, the vote being 15,625 to 15,218. Thirty-two per cent thought wine necessary, while 26 per cent put beer in that category.[26] These results, published early in 1922, showed that the stand of the *Journal's* editorial staff was not popular with a sizable group of the nation's doctors. A "wet" contended that the sentiment for medicinal liquor would have been clearer if the term "necessary" had been replaced in the questionnaire by a term like "useful."[27] In any event, the A.M.A.'s attitude toward alcohol and Prohibition measures changed.

A resolution passed by the House of Delegates in the spring meeting, 1922, called the regulations concerning medicinal liquor "a serious interference with the practice of medicine by those physicians who are convinced of the value of alcohol in medical practice" and called for a reliable supply of bonded whisky exclusively for medicinal use.[28] In the summer of 1923 a resolution condemned the required stipulation of the patient's illness, when liquor was prescribed, and the limit on the amount of liquor that could legally be prescribed.[29] In 1924 these points were reaffirmed, and changes in the Volstead Act were demanded.[30] From the mid-twenties on, the A.M.A.'s unrelenting opposition to the medicinal liquor regulations was made known to the Supreme Court and a Congressional committee.[31] Because so many physicians continued to prescribe whisky and brandy, reliable standards for these liquors were deemed necessary. The revision of the United States Pharmacopoeia, official 1 January 1926, therefore included whisky and brandy once again.[32] This was a severe defeat for the "drys," because they were more open to the charge that Prohibition laid a tax on the sick by requiring them to get a costly doctor's prescription in order to obtain a needed medicine. This line of argument was employed often by "wets."[33] It was particularly applic-

25 "The referendum on alcohol," *ibid.*, 1922, *78*, 194.

26 "The referendum on the use of alcohol in the practice of medicine," *ibid.*, p. 210.

27 Hobart A. Hare, "A lecture on alcohol and its use in medicine," *Therap. Gaz.*, 1925, *49*, 17.

28 "Resolution on Volstead Act," *J. Amer. med. Ass.*, 1922, *78*, 1709.

29 "Report of Reference Committee on Legislation and Public Relations, *ibid.*, 1923, *81*, 118.

30 "Resolution on the National Prohibition Act," *ibid.*, 1924, *82*, 1966.

31 See, for example, Lambert *vs.* Yellowley, 272 U.S., 581.

32 United States Pharmacopoeial Convention, *The pharmacopoeia of the United States of America, Tenth decennial revision*, Philadelphia, 1925, pp. 352-354, 356.

33 *Op. cit.* (n. 18), pp. 40, 161-162.

able to afflictions like colds and asthma, which were easily recognized and were usually treated in the home.[34] And it was also pertinent to easily detected conditions like old age, convalescence, and fatigue where alcohol was considered to have morale value, if no other.

No more than one pint of spirituous liquor could be prescribed for a patient within a ten-day period under the Volstead Act.[35] This regulation was nearly overturned by organized resistance within the medical profession. In December of 1922 it was reported that about one hundred leading New York City physicians had formed the Medical Association for the Protection of Constitutional Rights, with Samuel W. Lambert, Dean Emeritus of the College of Physicians and Surgeons of Columbia University, as President.[36] In May of 1923 Lambert gained a favorable decision from a New York District Court. The Judge noted that the Eighteenth Amendment dealt with the beverage use of liquors. He called the preservation of health one of the chief objects of the regulatory power and concluded that no person should be deprived of medicines "necessary for their relief, unless authority for such deprivation has expressly been conferred."[37] Lambert had complained that more than one pint of spirituous liquor within ten days was necessary for the treatment of certain ailments, and the Volstead Act admitted that the use of alcohol was sometimes necessary. Since liquor was a necessary medicine and Congress had no express power to limit the dosage, the Judge, speaking of the treatment of disease, argued that "the right of the public to . . . an adequate supply of a valuable therapeutic agent, transcends the present power of Congress to decree otherwise upon the basis of expediency or policy."[38]

A Montana district court reached the same conclusion in June 1923. The judge held that Congress might adopt any policy toward Prohibition provided

34 Whisky was recommended in scientific journals for the treatment of asthma. See William W. Duke, "Chronic use of adrenalin in the treatment of asthma," *J. Lab. clin. Med.*, 1928, *13*, 1013, 1018, and Duke, "Advances in the field of allergy as related to otolaryngology during the years 1927 and 1928," *Arch. Otol.*, 1928, *7*, 595. Many held alcohol useful in treating colds.

35 In 1921, the Volstead limits on liquor prescriptions were slightly expanded to permit both spirituous and vinous liquors in the same prescription. For simplicity's sake, this complication will not be considered in subsequent legal discussions since no important principle is involved. See An Act Supplemental to the National Prohibition Act, 42 *U. S. Stat.*, 222.

36 "Medical Society to test prohibition law," *J. Amer. med. Ass.*, 1922, *79*, 2013.

37 Lambert *vs.* Yellowley, 291 Fed., 643.

38 *Ibid.*

> . . . that there is a reasonable relation of means to ends, that the former . . . are not clear, unmistakable infringements of rights secured by other constitutional provisions . . . and are not unreasonable, extravagant, unnecessary interferences with property and personal rights.[39]

He claimed that the one pint limit made the erroneous assumption that therapeutics was an exact science. This restriction was held unconstitutional because it deprived "physicians and patients of liberty without due process of law, within the meaning of the Fifth Amendment . . ."[40] So long as legal medicinal liquor was permitted, the Congress could not set such arbitrary limits upon its use.

When the case of *Lambert vs. Yellowley* reached the Supreme Court, the appellant complained of the "unreasonableness and arbitrary character of the rigid prohibition of more than one pint in ten days, regardless of the judgment of the physician and regardless of the need of the patient."[41] The states were justified in considering the medicinal use of liquor reserved under the wording of the Eighteenth Amendment and "could rely upon the express assurance of that fact given by the Senate Judiciary Committee in reporting the measure."[42] The appellees rebutted that the restriction was appropriate legislation under the Eighteenth Amendment, that there was no right to practise medicine which was not subordinate to the police power.[43] The majority opinion of the Court upheld the one pint limit. It referred to the anti-alcohol stand of the A.M.A. in 1917 and to the previous decision on malt liquors before invoking the doctrine of implied powers to defend the legislative limitation.[44] This decision was bitterly criticized.

Mr. Justice Sutherland's dissenting opinion (McReynolds, Butler, and Stone concurring) claimed that state power had been violated unjustifiably.[45] It noted the reversal of the A.M.A. on medicinal liquor and that organization's *amicus curiae* brief attacking the Volstead Act.[46] The decision on malt liquors was considered irrelevant because of the difference in legislative findings. ". . . we must begin . . . with the assumption that vinous and spirituous liquors are in fact valuable medicines."[47] This opinion

39 United States *vs.* Freund, 290 Fed., 413.
40 *Ibid.*, p. 414.
41 *Op. cit.* (n. 31), 584.
42 *Ibid.*, p. 583.
43 *Ibid.*, pp. 586-587.
44 *Ibid.*, pp. 587-597.
45 *Ibid.*, pp. 597, 603-605.
46 *Ibid.*, pp. 599-600.
47 *Ibid.*, p. 601.

then repeated the argument of judges in the lower courts. If Congress could not prohibit the prescription of vinous and spirituous liquors for medicinal use, then it could not limit the prescription to an inadequate dose. Otherwise, what principle prevented the Congress from then changing the legal dosage to a few drops per day?[48] Dr. Lambert and others signed a letter condemning the majority decision.[49] The A.M.A.'s president applauded this letter in his 1927 address.[50] The A.M.A. had apparently become more concerned with the freedom of the individual doctor than with the abolition of alcoholic evils.

Individual doctors differed on the utility of alcohol, regardless of the A.M.A.'s current position. Medicinal liquor was still prescribed for a wide range of ailments in this period. Replies to the questionnaire sent out by the *Journal of the American Medical Association* reported the use of whisky in treating pneumonia, influenza, other acute infectious diseases, difficulties of old age and general debility, diabetes, heart failure, shock, anemia, asthma, catarrh, cancer, phenol (carbolic acid) poisoning, colds, dyspepsia, dysmenorrhea, neuritis, rheumatism, snake bite, heart disease, blood pressure disturbances, toxemia of pregnancy, uremia, alcoholism, and insomnia. Beer was recommended for lactation, convalescence, debility, dyspepsia, anemia, and old age. These conditions were also cited by defenders of wine, which was called a substitute for whisky in certain situations.[51]

One doctor, on the other hand, thought alcohol could be justified in only three conditions: warding off a cold, dispelling the worries of convalescence, and rendering the lot of incurables more tolerable. He wanted to know why alcohol was still administered in various therapeutic efforts and issued the following challenge: ". . . whatever is demonstrable ought to be communicated. I am anxious to learn of any established therapeutic efficiency of alcohol."[52] Arthur Dean Bevan, once president of the A.M.A., limited alcohol to one role—preventing delirium tremens among chronic alcoholics who were hospitalized.[53] Another doctor claimed that alcohol cured no disease, was therefore not a medicine, and had no place in medical practice. He asserted that "the forward-

48 *Ibid.*, p. 602.

49 "Shall Congress have power of life and death over the sick," *J. Amer. med. Ass.*, 1927, *88*, 1436-1437.

50 "Address of President Wendell C. Phillips," *ibid.*, pp. 1645-1646.

51 *Op. cit.* (n. 26), 210-211.

52 A. D. Bush, "Alcohol," *Med. J. Rec.*, 1927, *126*, 663.

53 Quoted in Earl L. Douglass, *Prohibition and commonsense*, New York, 1931, p. 72.

looking doctors, the ethical intelligent doctors, are against liquor prescriptions almost to a man."[54] The Anti-Saloon League compiled a set of quotations from medical authorities which indicated that the use of alcohol in medicine should be greatly limited or abolished.[55]

More specifically, it appears that five general categories of disability were stressed in the dispute over medicinal alcohol. These were: influenza, pneumonia, and other acute infectious diseases; tuberculosis; diabetes mellitus; heart conditions; and the failings of old age. Some American research on these ailments provoked bitter, partisan criticism. In the following discussion, much reliance was placed on a collection of special articles which appeared in 1932.[56] These opinions, written by presumed experts, were particularly valuable because they summarized medical research quite close to the end of Prohibition.

"Drys" were extremely embarrassed in the early twenties by persistent claims that spirituous liquor had saved many lives during the great influenza epidemic of 1918-1919. Seventy-five per cent of the doctors who favored the use of whisky, according to the replies to the A.M.A.'s poll, prescribed it for influenza and pneumonia.[57] (Pneumonia was the complication that often made influenza fatal.) Perhaps no "wet" made more of this claim than Charles Taber Stout, the "chemotherapist" who had testified during the 1921 Congressional hearings on medicinal malt liquor. He charged that the A.M.A. had refused to act upon the knowledge that spirituous liquor was valuable in treating influenza because the Eighteenth Amendment had not yet been approved by the Supreme Court and that organization's fight for Prohibition might be lost through such an admission. He argued that proper digestion was essential in fighting an acute infectious disease. Otherwise germicides would be ineffective and antibodies would not form. Alcohol, he felt, was an antidote to the effects of toxins on the digestive organs.[58]

54 Howard A. Kelly, "The abuse of alcohol as a medicine," *World's Work*, 1928, *55*, 377.

55 "Authorities on non-alcoholic medication in the treatment of sickness or disease," in *Anti-Saloon League Year Book, 1931*, Westerville, Ohio, 1931, pp. 148-154.

56 Haven Emerson, Ed., *Alcohol and man*, New York, 1932.

57 *Op. cit.* (n. 26). A symposium in a dry publication left the impression that alcohol was neither a preventative nor a specific for influenza. "Alcohol and influenza: A symposium by American physicians," *Sci. Temp. J.*, 1920, *29*, 1-14.

58 Charles T. Stout, *The eighteenth amendment and the part played by organized medicine*, New York, 1921, pp. 109-111.

In 1920, a resolution to condemn the use of alcohol in the treatment of influenza was tabled at a meeting of the A.M.A.[59] The Scientific Temperance Federation of Boston was rebuffed by a Harvard professor of medicine when it requested an opinion concerning the value of alcohol in treating influenza. The professor, who thought the Federation should not disseminate medical information, stated that alcohol was useful in treating the disease and insisted that its prescription was a matter best left to the discretion of the individual doctor.[60] One doctor, who had served aboard a troop ship, reported that brandy had not improved the condition of any of his influenza patients who would not have gotten better anyway.[61] And Dr. Bernard Fantus, an extreme "dry," claimed that liquor had made some afflicted persons feel better during the influenza epidemic. Consequently, they did not go to bed and some contracted fatal pneumonia as a result.[62]

A study dealing with the alcoholic treatment of acute infectious diseases, including influenza and pneumonia, was published in 1925. Mice were exposed to these diseases. Some were then given alcohol, while the others were not. The alcoholized mice suffered a more rapid mortality, and dissection showed a higher incidence of bacteria in their lungs than that prevalent in the control group. The experimenter then generalized his results to the conclusion that "alcohol delays the removal of inspired bacteria from the lungs and favors the invasion of the blood stream."[63] This study was reviewed in *The Therapeutic Gazette,* an aggressively "wet" journal. The investigator was criticized for generalizing recklessly. He should have restricted himself to a factual account of the way the mice reacted to his tests because, "This is one of the general statements which do so much harm in the hands of the prohibitionists and which limit the confidence of practitioners in experimental work."[64]

Medical authorities were sometimes quoted to the effect that vinous or spiritous liquor was an "absolute necessity" in the treatment of some cases of pneumonia.[65] An article in *Alcohol and Man*

[59] Victor G. Vecki, *Alcohol and prohibition in their relation to civilization and the art of living,* Philadelphia, 1923, pp. 127-128.

[60] "The use of alcohol in the treatment of influenza," *Ther. Gaz.,* 1920, *44,* 454-455.

[61] D. Nathan, "Alcohol: its status quo ante, never," *Med. Rec.,* 1920, *98,* 186.

[62] Bernard Fantus, "The abuse of narcotics," *J. Amer. med. Ass.,* 1931, *96,* 1691-1692.

[63] Ernest G. Stillman, "Persistence of inspired bacteria in the lungs of alcoholized mice," *J. exp. Med.,* 1924, *40,* 360.

[64] "Alcohol and infection," *Ther. Gaz.,* 1925, *49,* 100.

[65] Charles H. Towne, *The rise and fall of prohibition,* New York, 1923, p. 92; Charles Willcox, "The use of alcohol in medicine," *Va. med. Monthly,* 1926, *53,* 386.

discussed the effect of alcohol on the heart and blood vessels, and whether alcohol aided the body cells in destroying the infecting bacteria.[66] Alcohol was held to be an unsatisfactory circulatory stimulant. Clinical studies of alcoholics showed that their pneumonia mortality rate was higher than that of other individuals of the same age. Animal experiments showed that alcoholized subjects were less able to resist bacteria and toxins than were the control groups. Th author inferred that alcohol lessened the ability of body cells to destroy such bacteria and toxins. "The literature, however, fails to reveal any evidence for or against its use on the basis of case mortality per cents in pneumonia patients treated with alcohol, or not so treated."[67] Alcohol, a brain depressant, was useful as a sedative and for relief from worry. The view that alcohol should be administered for its food value was invalidated by pneumonia's comparatively short duration. Far from accepting the "absolute necessity" of liquor, this article concluded, "There is no experimental or clinical evidence that supports the view that the therapeutic use of alcohol should affect pneumonia favorably."[68]

The extensive use of alcohol in the treatment of tuberculosis had passed before 1920. *Alcohol and Man*'s evaluation seems to summarize the question satisfactorily. Alcohol had little or no special value as a food, and little or no effect on the disease or its symptoms. Various liquors were of some value as tonics and sedatives. "Late in the disease brandy and champagne are of great value in some cases, and a few patients with slowly progressing chronic disease unquestionably prolong their existence by a judicious, although rather free, use of spirits."[69] Numerous ill effects were, however, attributed to treating tuberculosis with alcohol.

Alcohol was widely used in treating diabetes mellitus, particularly before the advent of commercially prepared insulin—a relatively new product in the twenties. Excess sugar in blood and urine, and acidosis, the depletion of blood and tissue reserves by such agents as acetone, were the foremost symptoms of this illness. Medical science therefore searched for substances which had distinct food value but were not converted by the body into

[66] Joseph L. Miller, "Use of alcohol in pneumonia and other infections," in Emerson, *op. cit.* (n. 56), p. 167.
[67] *Ibid.*, p. 168.
[68] *Ibid.*, p. 169.
[69] Lawrason Brown and Joseph T. Eagan, "Alcohol in tuberculosis," *ibid.*, p. 175.

either sugar or acetone. Early twentieth century research indicated that alcohol fulfilled these conditions. But some American research, published in 1922, undermined the use of alcohol in diabetes mellitus without denying these findings. Diabetics were found to be subject to a calorie-intake limitation. Sugar in the urine and other symptoms of diabetes resulted when this limit was exceeded, even when the excess calories were administered in the form of alcohol, which was not itself directly converted into sugar. Acidosis also followed heavy doses of alcohol under certain circumstances.[70] Experimental evidence showed that insulin was not absorbed by the stomach when administered in a dilute alcohol solution.[71]

More general works agreed that alcohol had been reduced to the role of improving the patient's morale. Though not ruling out the use of alcohol altogether, a textbook said, "Diabetic patients require no alcohol and as yet I have not found it necessary or desirable to have a license to prescribe it, and this statement applies to my assistants as well."[72] The following summary of the situation appeared in *Alcohol and Man*:

> . . . the use of alcohol in diabetes is no longer the problem it was. Its antidiabetic action is too feeble compared with that of insulin to be of practical significance, dependence on it as a food has been made unnecessary by insulin, and its stomachic and tonic values are of no greater importance to the patient whose diabetes is being properly managed than would be the case for any group of normal persons. On the other hand there is no contra-indication, in diabetes, to the consumption of moderate quantities of alcoholic beverages, and if and when these contribute to a patient's happiness and contentment, they may be given with considerable advantage.[73]

But general articles on the value of alcohol in medicine still included diabetes mellitus among the diseases where alcohol was useful.

The effect of alcohol on the circulatory system was possibly the most involved medical controversy in this study. It had practical application in treating the acute infectious diseases and certain types of poisoning when it was desirable to improve the pulse

[70] Frederick M. Allen and Mary B. Wishart, "Alcohol in the diabetic diet," *J. Metabol. Res.*, 1922, *1*, 281-306; Frederick S. Leclercq, "Overnutrition with fat and alcohol in severe diabetes," *ibid.*, pp. 307-317.

[71] N. R. Blatherwick, L. C. Maxwell, and M. Louisa Long, "The effect of the oral administration of alcohol upon the blood sugar of rabbits," *Amer. J. Physiol.*, 1924, *67*, 346-347.

[72] Elliott P. Joslin, *The treatment of diabetes mellitus*, 3d ed., Philadelphia, 1923, p. 466.

[73] Russell M. Wilder, "Alcohol in the treatment of diabetes mellitus," in Emerson, *op. cit.* (n. 50), pp. 160-161.

rate and heart output of the patient. A leading pharmacologist claimed that the heart could be stimulated by the nutrient action of alcohol. He therefore favored its discriminating use in pneumonia, pointing out that alcohol also dilated the cutaneous vessels. This removed the blood from congested internal organs and lessened the venous distention of the heart. He claimed that alcohol was valuable in combatting such poisons as snake venom, strychnine, aconite, and veratrum. "The main element in this action is the reflex stimulation, increasing the pulse rate, the blood pressure, and the respiration."[74] Alcohol, though recognized as a depressing drug, was thus held to have temporary stimulating effects. Many other products, such as ether, aromatic oils, camphor, or ammonia, could also cause reflex stimulation.

It was sometimes suggested that alcohol, a depressing drug, had no place in treating heart conditions. This view was not universally accepted, although the nineteenth century doctrine that alcohol was a true cardiac stimulant was discredited. Alcohol was supposed to relieve sudden syncope through reflex stimulation. Paul Dudley White and others said it relieved angina pectoris, though it was inferior to the nitrates in this respect.[75] Alcohol might be indicated in temporary conditions, such as acute myocardial insufficiency, and in chronic lesions, to relieve the patient's worry.[76] It allegedly relieved the burdens of a tired heart by dilating the capillaries and reducing the amount of blood returning to that organ.[77] All too often, however, it was simply asserted that alcohol either was or was not valuable in treating heart conditions, without going into particulars.

Improving the morale of the aged was a widely accepted function of alcohol. Oliver T. Osborne, whose textbook on therapeutics was moderate on the problem of alcohol, made these claims for its use:

> A small amount of alcohol acts as a gentle narcotic to the brain, dilates the peripheral blood vessels, gives a feeling of surface warmth to the extremities, and depletes the internal congestion areas, often starts a failing appetite, quiets an irritable heart, and gives a general feeling of comfort to these individuals.[78]

[74] Torald Sollmann, *A manual of pharmacology and its applications to therapeutics and toxicology*, 3d ed., Philadelphia, 1928, p. 690.

[75] *Ibid.*, p. 691. Paul Dudley White, *Heart disease*, New York, 1931, pp. 616, 618-619.

[76] Sollmann, *A manual of pharmacology*, *op. cit.*, p. 691.

[77] "The action of alcohol on the circulation," *Ther. Gaz.*, 1925, *49*, 655-656.

[78] Oliver T. Osborne, "Harmfulness of caffeine and value of alcohol in old age," *Med. J. Rec.*, 1924, *120*, clxiv.

According to him, "Only an ignorant layman prohibitionist and a hypocritical physician will deny the value of a little alcohol in the discomforts and weakness of old age."[79] The section on old age in *Alcohol and Man* stated that alcohol improved body functions that were likely to be defective at that time of life. It acted as a diaphoretic and diuretic, in addition to the effects previously mentioned. Although other foods and drugs would supply these needs, none could fulfill all these functions as satisfactorily as alcohol.[80]

The question of alcohol's food value in medical practice was prominent in the debate. (Some writers seemed to assume that a substance could have food value without being literally a food.) Only unique food properties, of course, could justify alcohol's food value in Prohibition America. One source suggested that alcohol was in that category.

> From the food standpoint alcohol . . . is, perhaps the most readily oxidizable food substance we know. Sugar is its only rival. It is an efficient producer of energy, which can save fats and proteins. It may supply up to 30 or 40 per cent of the caloric requirements of the body.[81]

Another pointed out that the oxidation processes languish in old age. Hence alcohol was particularly valuable at that time of life. He continued:

> Now in some cases of diseases a state akin to that of age is introduced, either because the patient cannot take ordinary food, cannot digest it, cannot assimilate it, or loses it as fast as it is taken, as in diabetes. At this point alcohol takes its proper place, since it not only is absorbed without digestion, but is speedily utilized, giving energy not only to the body in general, but to the digestive processes as well . . . a drink of alcohol enables a man 'too tired to eat,' . . . to take food and utilize it.[82]

Alcohol took the place of carbohydrates and proteins in the body, permitting these substances to assist physical recovery.

While it was sometimes asserted that alcohol was not a food, it was also common to point up the difficulties in its continued use as a nutrient. As one authority put it:

> Alcohol cannot build up tissue, but it can spare or replace fats and carbohydrates in the food, and can prevent excessive protein destruction (tissue waste) for a time. It may, therefore, serve as a useful food in some conditions of great exhaustion or waste, where the tissues would otherwise be broken down to furnish the energy to maintain life. But in any

79 *Ibid.*

80 Harlow Brooks, "The use of alcohol in old age," in Emerson, *op. cit.* (n. 56), pp. 163-165.

81 Clarence Fisher, "Alcohol and its uses in medicine," *Ill. med. J.*, 1933, *64*, 383-384.

82 Hare, *loc. cit.* (n. 27), pp. 17-18.

> case alcohol cannot be a profitable food for any great length of time, because of its central nervous effects, and because it causes marked wear and tear on the body structures.[83]

It was claimed, then, that alcohol was valuable both as a drug and a food; but "drys" looked for substitutes producing the same effects.

Although the foregoing discussion has revealed some of the partisan feeling on the subject of medicinal alcohol, there seems to have been an area of general agreement concerning the biological properties of alcohol. It was commonly considered effective in producing euphoria, nourishment, and sedation.[84] It was no longer called a true stimulant nor an effective germicide in the body. Claims that wine was an effective germicide, apparently reprinted in American newspapers from French sources, were ridiculed.

> Bacteriologists will be quite astounded by such claims of germicidal potency; while physiologists will wonder how alcohol can be induced to remain long enough in the alimentary tract to exercise this surprising germ-destroying function. . . .[85]

Alcohol was rarely called the difference between life and death, however great the claims for its value. Some sources which gave alcohol a considerable place in medical science specifically said that it would not save life.[86] An ultra-dry said that it was "not a stimulant, but a depressant; not a food, but a narcotic; not a commodity which brings happiness."[87] This statement does not really conflict with the view that alcohol had a stimulating effect, a distinct food value, and a significant role in creating euphoria if wisely and moderately used.

Because of the highly technical nature of this problem, the stand of professional groups figured prominently in the debate. Most significantly, the A.M.A. implicitly repudiated its anti-alcohol resolution of 1917 during a period when the medicinal value of alcohol continued to decline in prestige. No important new uses for medicinal alcohol were revealed in this review of the medical literature from 1920-1933. The following is a representative summary statement:

[83] Walter A. Bastedo, *Materia medica, pharmacology, therapeutics and prescription writing*, 3d ed., Philadelphia, 1932, pp. 398-399.

[84] A widely quoted defense of medicinal alcohol, claiming that it created mild euphoria, was Roger I. Lee, "Use of alcohol in medical practice," *J. Amer. med. Ass.*, 1925, *85*, 577-579.

[85] "Milk vs. wine," *ibid.*, 1933, *100*, 1341.

[86] Osborne, *op. cit.* (n. 2), p. 242.

[87] Earl L. Douglass, *Prohibition and commonsense*, New York, 1931, p. 75.

As therapeutic agents alcoholic beverages have a place in rendering more comfortable and peaceful the disturbances of chronic disease and old age. Sometimes it is useful to increase appetite. Beyond this there are very few conditions needing alcohol and alcoholic beverages in their treatment. Much of the use of alcohol and alcoholic beverages of the past no longer exists for better therapeutic measures have replaced them. It seems a fact that in both private and hospital practice the utilization of alcohol and alcoholic beverages by the better trained physicians has decreased greatly and is continuing to decrease.[88]

Much of the confusion over alcohol may be attributed to the discrepancy between its true nature and its temporary effects. The ultimate disagreement between "wets" and "drys" was whether alcohol should be severely restricted to protect both individuals and society from possible ill effects which both admitted. "Drys" justified the restrictions and a campaign to make alcohol therapeutically unfashionable in terms of these possible ill effects. "Wets" called the limited value of alcohol in medical practice a sufficient reason for doctors being left free to administer it as they saw fit.

[88] "Summary," in Emerson, *op. cit.* (n. 56), p. 176.

Ibn al-Waḥshīya's "Book of Poisons," *Kitāb al-Sumūm*: Studies in the History of Arabic Pharmacology II[1]

MARTIN LEVEY*

ONE of the more interesting areas of study in medieval Arabic pharmacology is that of poisons and their antidotes. From very early times, a mysticism and a mythopoeic texture have been woven about the subject of poisons. Much of this kind of superstition remains in Western thought and folklore today. For example, there is the harm caused to the foetus when the mother sees or touches certain objects. Or there is the danger of imminent death for a man who has intercourse with a girl who has taken a certain drug.

Not only are mythology and sociology involved in books on poisons, but there are also the origins of the supernatural attributes of poisons and other irrational concomitants to be considered. The more medical and scientific aspects concern the chemicals used, materia medica, syndromes caused by poisons, antidotes, and the more theoretical matters relating to Arabic medicine.

The author, Abū Bakr Aḥmad b. ʿAlī, called ibn Waḥshīya as the title declares, flourished about 900 A.D. He was born of an Aramaic family in Iraq and was an intensely nationalistic Nabataean. At that time the Nabataeans were looked upon as an extremely mystical and superstitious people just as Westerners often thought of the Chaldaeans and Hindus. Although it was the intention of ibn Waḥshīya to point out that his people were highly rational and objective, nevertheless these matters were so confused at the time that he himself wrote much on alchemy and occult sciences. In his works, furthermore, he described many of the superstitious beliefs of the Nabataeans without realizing their extreme subjectivity.

Ibn Waḥshīya's most famous work is the *Kitāb al-falāḥa al-nabaṭīya*, a book on Nabataean agriculture supposedly a transla-

* Department of the History of Science and Medicine, Yale University School of Medicine. This study was carried out with the support of the USPHS Grant No. RG 7391.

1 The previous article in this series was published in this journal, 1961, *16*, 394-410.

tion from the original Babylonian sources. This has been proved false.[2]

The "Book of Poisons"[3] under discussion roughly follows the same pattern of extolling the Babylonian-Aramaean-Syrian culture as opposed to that of the conquering Arabs. It was originally written by Yārbuqā al-Nabaṭī al-Kasdānī al-Fuqāi of the family of Barsāwiya. In it is contained the book whose author is Habushāṭ of the family ᶜAqarfūqā. Ibn Waḥshīya is mentioned as the translator.[4]

The publication of books on poisons and their antidotes persisted at a lively rate from the Arabic period through the entire Renaissance. Ibn Waḥshīya's text is valuable in that it helps one to trace back the sources of these books. First it is necessary to examine some works on this subject by the Greeks other than those mentioned by Ibn Waḥshīya. One of the early Greeks to present poisons as a separate subject was Nicandros of Colophon, Ionia, who flourished about 275 B.C. He wrote a poem on poisonous animals, their venoms and antidotes, and another on poisons in general and their antidotes.[5]

A more famous name in this field is that of Mithridates Eupator, who was born in Sinape 132 B.C. and was King of Pontas from 120 to 63. Pompeius had his investigations translated into Latin. Mithridates worked on the universal antidote now known as mithridate and on the administration of doses of poisons gradually increased to produce tolerance.[6]

Philumenos, a younger contemporary of Galen, wrote on animal poisons and their antidotes. His work was utilized by Oribasius in the fourth century.[7] Ibn Waḥshīya himself in the introduction to the text gives a very revealing picture of the sources of early Arabic poisons and pharmacology in general. It is well worthy of quotation.[8]

[2] This work is still unedited and has not been translated. The present author has the Aya Sofia copy in microfilm at hand.

[3] This study is based upon four copies of the text: British Museum 1357, Leyden 1284, Velieddin 2542, and Šehit Ali 2073.

[4] Velieddin MS, fol. 138a.

[5] Nicandrea. *Theriaca et Alexipharmaca recensuit et emendavit, fragmenta collegit, commentationis addidit Otto Schneider. Accedunt scholia in theriaca ex recensione Henrici Keil, scholia in Alexipharmaca ex recognitione Bussemakeri et R. Bentlei emendationes partim ineditae.* Leipzig, 1856.

[6] Reinach, T. *Mithridate Eupator, roi de Pont.* Paris, 1890.

[7] Puschmann, T. Nachträge zu Alexander Trallianus. Fragmente aus Philumenus und Philogrius. *Berl. Stud. class. Philol.*, 1887, 2, 189

[8] Velieddin MS, fol. 141a-142a.

The men [the Nabataeans] had certainly compiled many books on poisons. On this subject, those books which are better and larger, contain more of the uses, and which are more extensive in detail were compiled by Indians and Persians. One of these is a book of the Indians and is called "Book of Shānāq,"[9] which means, "The Book," "The Unique," or "Book of the Orphan."

There is another great anonymous book which contains extensive descriptions of the properties [of poisons]. There is also a book by an Indian called Tammashah; it contains many words and is extensive. The fourth book which speaks of poisons and odors in plants is attributed to a man called Bahlīndād, an Indian. Then there is a book which was compiled for some Persian kings. It was translated [into Arabic] with the title "The Five Signs." Then there is a book compiled for the Persian king, Noshirowān the Just. In it there are thirty chapters, each of which is divided into three sections thus making ninety sections. I have also seen a book on poisons compiled by a Persian. I obtained it at Isfahan where it had been in the possession of some kings of Isfahan. Then there is a great book which has been translated [into Arabic]; the meaning of its Arabic title is "The Rhymed Book on Poisons." In it is discussed cultivation of the Persian language. The book is famous. There is a pleasant book also belonging to those works attributed to Buzurj-mihr[10] on lethal drugs and the symptoms arising from poisoned food. I believe, my dear son, that this book is much earlier by some time than those of Buzurj-mihr. Its author, however, erased his name [from the book]; the book was attributed to Buzurj-mihr after his [the author's] time.

There are also those books which are from the Greeks. One of them contains two treatises on poisons of Dioscorides appended to a book on hashish. There is a good book on Theophrastus. I can hold it in esteem, my dear son, for what it contains on the subject of remedies. Then there is a treatise on poisons attributed to a man called Alexander. I don't know if he is Alexander the physician, or the other one who is a philosopher. I know two Alexanders aside from Alexander the king, and the Alexander who compiled a book on art. The latter is an Egyptian and is a philosopher and scholar.

There is a book belonging to the Egyptians also attributed to Cleopatra, the queen. They assert that it was compiled for the queen. The book has many sections containing wonders. I believe that some of them are true. The author speaks of properties of substances which it is asserted will kill one at a glance thereon. This is without drinking or touching them. Our friends who are from Kasadān have something similar to this. I shall describe it to you in this book, my dear son. Then there are discussions of poisons in the books on Egyptian agriculture if one cares to find them.

I have seen a book attributed to another people and which I have not mentioned here. There are also anonymous books belonging to several peoples. I have not listed them here since this would cause the discussion to be overlong.

The genuine Arabs, who were from Yemen, had no science, no wisdom, no understanding reasoning, and no solid thought. But, when the Islamic power rose, translators prepared for them the books of the wise

[9] Chanakya or Kautilya, the author of *Arthashastra,* "Treatise on polity" (of the Ayurvedic period, 321-296 B.C.), translated by R. Shamasastry. Mysore, 1929. *Cf.* P. Ray, *History of chemistry in ancient and medieval India.* Calcutta, 1956, pp. 40-107.

[10] Name of the prime minister of Noshirowan.

men of other nations and their sciences. They [the Yemenites] studied and learned them. They also compiled books in the Islamic Age on poisons. One of them, Jābir b. Ḥayyān al-Ṣūfī, is said to be from Azd. If this is true, then he was a genuine Arab. This book of his on poisons is a great work containing numerous and extensive accounts as well as many practical applications. It is a wonder.

A book which was compiled by Yaḥyā b. al-Biṭrīq al-Rūmī on poisons in the time of al-Rashīd is also a great and useful book. Ibn al-Biṭrīq also translated two anonymous treatises on poisons and articles from ancient scholars. The author of "Memorandum Book of the Physician" declares that discussion of poisons in very early Islam and pre-Islamic times was rare. A man called ᶜIsā b. Sāsa compiled a book on poisons as has been done nowadays by others such as Qusṭā b. Lūqa and Yaᶜqūb b. Isḥāq al-Kindī. But I refrain from speaking of the books of these Persians, Greeks, Egyptians, and Muslims. I wish to say that you may collect the books I mentioned or at least some of them since it is impossible to find them all. Look over these books and then my book whose account comes from Kasadān.

Further evidence on the importance of Indian sources is to be found in the great bibliographical work, *Kitāb al-Fihrist* of 987 AD. by al-Nadīm.[11] A *Kitāb al-sumūm* of Indian origin is listed as being in five chapters. "It was translated from the Indian language into Persian (Pahlawī) by Manka (Manīkya) at the suggestion of Khālid the Barmacide and was copied in Persian by Abū Ḥātim of Balkh. Later it was translated into Arabic by ᶜAbbās b. Saᶜid who read it to the Caliph al-Ma'mūn." This work may be similar to that translated by ibn Waḥshīya which also contains five divisions. Unfortunately, the former is lost.

The important Indian work, "Book of Poisons of Shānāq (Chanakya)," known in the Arabic[12] and mentioned by ibn Waḥshīya is listed in the old Arabic bibliographical literature.[13] Shānāq is described as one of the old medical men of India who had much experience in the practice of the science of medicine and had extensive knowledge of science, philosophy, and astronomy. He occupied an important position at the courts of the Indian rulers. Chanakya's book on poisons is also divided into five chapters but is much shorter than that of ibn Waḥshīya. In both these works the origin of the poisons is given as animal, vegetable, or mineral. Although there are many points of resemblance in these two texts, they are nevertheless, of different origins. The points of contact of the Indian and Arabic civilizations are not

11 G. Flügel, Ed. Leipzig, 1871-1872, p. 303.

12 Strauss, B., Ed. Das Giftbuch des Šānāq. *Quell. Gesch. Naturw.*, 1935, *4*, pt. 2.

13 Fihrist, 270-271; Müller, A., Ed. ibn Abī Uṣaibiᶜa's Kitāb ᶜuyūn al-anbā' fī ṭabaqāt al-aṭibbā. Königsberg, 1884, vol. II, pp. 32-33..

difficult to see in the poisonous materials and their antidotes as well as in the general superstitious approach to these matters.

At one point ibn Waḥshīya writes:[14]

> A man called ʿĪsā b. Sāsa compiled a book on poisons as others nowadays have done such as Qusṭā b. Lūqa and Yaʿqūb b. Isḥāq al-Kindī. But I refrain from speaking of the books of these Persians, Indians, Greeks, Egyptians, and Muslims. I wish to say that you may collect these books I mentioned or at least some of them since it is impossible to find all. Look over these books and then my book whose account comes from Kasadān.

Evidently, the subject of poisons was a fashionable one at that time.

The text under discussion has an introduction by ibn Waḥshīya in which he deplores the uses of poisonous materials by the people and the necessity for descriptions of them and their antidotes. The five chapters of the book cover the subject as follows: 1. Lethal sights; 2. Fatal sounds; 3. Lethal scents; 4. Ingested poisons by food or drink; 5. Poisons by contact or nearness. Poisons, according to the author, were derived from animal, plant, and mineral matter. For example, the salamander, a mythical creature as described, was frequently supposed to be the source of a very effective poison. The mixture of superstition, supernatural powers, and a form of objectivity often found in the Indian medical literature is revealed in the discussion of the salamander poison which is now well known in Western mythology.[15]

Description of the Remedy That Saves One from the Effect of the Salamander's Cold [Humor]

Take fifty pieces of the fruit of the *dīndāqarūbā*[16] which abū Bakr says is *al-balādhur,* the oriental anacardium. They must be good and plump. The juice is extracted completely and set aside. Two mithqals each are taken of Chinese rhubarb, clear myrrh, Indian nard, cinnamon,[17] Syriac nard,[18] saffron, Armenian broom-plant,[19] schoenanthus,[20] galingale, cuscuta, opium, euphorbium, clove, peeled seed of ben nut, and also four dirhams of gum mastic, two and a half dirhams each of balsam, ginger, Arabian aloes, agaric, bitter almond, and black cumin, and two dirhams each of

14 Velieddin MS, fol. 142a.

15 *Ibid.*, fol. 182a-184a.

16 *Dīndāqarūbā* is unknown in the literature but according to an Islamic legend, the great Arabic historian Aḥmad ibn Yaḥyā al-Balādhuri (IX cent., Baghdad) died as a result of a dose of *al-balādhur.* Meyerhof, Max, Ed. *Sharḥ asmā' al-cuqqār.* Cairo, 1940, p. 62.

17 *Salīkha.* Leclerc, L. *Traité des simples par Ibn al-Beithar.* Paris, 1877, 1883, no. 1205.

18 *Sunbul al-tayyib.*

19 *Shiḥ.* Meyerhof, *op. cit.* (n. 16), p. 337, qaisum, a species of armoise.

20 Text has *idkhir;* cf. Meyerhof, *op. cit.* (n. 16), p. 8 for *idhkhir.*

seed of fennel and its root, seed of celery and its root, castoreum, root of olive, root of mahaleb, pepper, and long pepper. Each is pulverized to such an extent that they become 'atoms' except for the mastic and agaric. They both are dissolved in vinegar and in the honey of oriental anacardium. On it the other pulverized drugs are thrown. Then it is thrown in an earthen pot. On it is poured the vinegar in which the roots have been macerated. All are cooked with a low fire until they become like the state of thick honey. The roots and basic sources are removed from their extracts and are thrown out.

One mithqal of it is weighed for the victim. When he vomits whatever is in his belly, he is given one mithqal of it together with hot water in which the mastic has been boiled for one hour. Rain water is best if God wills. This remedy, in addition to freeing him from the poison, serves as a counteractant to vertigo, chilling of the brain,[21] raising of phlegm on the stomach and breast, loss of strength, twisting of the face and tongue, taking cold in the sinews and the [consequent] damage, if God wills.

Description of Another Compounded Poison, the Fourteenth

Know that this poison and that before it, that is, the brain of salamander and its oil are what one aims for. Whoever fears for the souls of kings, and others who need this put it in their stone rings to kill themselves by sucking it when they are afraid for their souls; this is because it is a poison [which acts] in an hour, and it is also one which poisons one's clothing and handkerchiefs. We shall explain this and others further on. In regard to the simple ones [of the poisons] we shall mention the operations involved.

Arabic works on poisons generally give first the name of the poison, its source, the effects and symptoms, and then the antidotes and treatment. The following is an example of this order.[22]

"On Treatment of One Who Takes the Leaf of a Tree Called "al-zalima," a Tree Which Rises to the Height of the Thin Cypress

This is a tree whose leaf resembles the leaf of the wild cypress in which there is great bitterness as the bitterness of myrrh, and its smell is bad. It overtakes nearby trees. Evil people sometimes take its leaf and macerate it with water together with 'bittersalt.' When it has been in this water with the salt for two or three days, it is black and a bad odor diffuses from it. When two dirhams of it is mixed with two dirhams of anise seed, the abominable odor is annulled as well as the anise odor. These four dirhams are pulverized well and concealed in food or drink. When it reaches the belly, it causes violent fainting, successive gasps, redness of the face and eyes, uninterrupted flowing of mucus from the nose, continuous coughing, and a hoarse sound in the throat. If he [the victim] is not treated quickly, he dies.

The treatment is that he be made to vomit by using hot water in which dill and celery seed have been cooked. A feather dipped into sesame oil is let down into his throat. After he has vomited thoroughly, make him drink the wine of pomegranate grain with inspissated juice of quince.

21 I.e., an excessively cold humor.

22 Šehit Ali MS, fol. 135a-135b.

Then pulverize two dirhams of tabasheer and mix one half dirham to one half mithqal of pulverized Nabataean thorny carob with it. Make him drink it with fifteen dirhams of inspissated juice of quince. Cut unripe quince into pieces and dry them. Pulverize it and throw it on good rosewater and make him drink it. Poultice his stomach with myrtle leaf, gallnut, pomegranate rind, cinnamon, and costus moistened with rainwater, continuously. Put his body and feet in cold water. See that he does not look at anything black or dark; on the contrary, make him sit in the light and let him look at the sun. Make him drink fresh milk in which Babylonian cress was boiled. By this he will be saved with the leave of God, may He be exalted.

An interesting section discusses at length the symptoms which may be detected in one who has taken poisoned food or drink.[23]

These lethal poisons, divided into compound and simple [types], are mixed with food and drink in many variations. It is discussed here since they are much used by people for their ability to kill. It is necessary that we mention that which has not been touched on previously, namely, the symptoms which appear as a result of the poisoning of food and drink. One must be aware of these and cautious in regard to them when they are observed and when any indications of these are present so that one may be saved from falling prey to the evil and so as not to require the remedy which is used in case of danger. Let us commence to mention comprehensively the syndrome that is evident when a man ingests poisoned food or drink. Then the apparent characteristics of the food and drink are set next to it. It is convenient that one learn it by heart.

Whenever someone eats or drinks something poisoned, there appears on his face a violent frowning and extreme grimness; his color becomes purple, black, blue, or is lost. A serious anxiety and confusion of mind appears at the same time, together with a trembling of the heart and a fright without [resemblance to] anything. There is an abundant flowing of tears from the eyes. A deep redness appears [in the latter]; the eyes light up. He trembles, shakes, and emits perspiration which is either very hot or very cold. He turns toward the sides without cause. A laziness, languidness, and brokenness of body overcomes him. He laughs excessively without cause. His reason is so confused that he performs nonsensical actions with his hands and fingers; he rubs them often and frequently strikes his hands. He stamps nonsensically upon the ground, stands up, goes, comes, always stretches his arms in walking and grumbles with his voice. He appears intoxicated as if he had drunk an excess of wine; he attaches himself to people near him and his talkativeness increases. Often some saliva flows out of his mouth, a little at a time, so that his mouth becomes extremely dry. Often he makes his teeth rattle as if his reason had absolutely passed away. These are the symptoms which appear when one eats or drinks poisoned food or drink.

The book concludes with: "We have completed what we found mentioned on poisons and have explained them as much as we can. The evil in this world is more manifold than goodness but I prefer that this book be not more than in this proportion since

23 Velieddin MS, fol. 171a.

this measure is sufficient. Here the whole of the book was completed by God's grace and His divine guidance."

The work on poisons by Jābir which is mentioned by ibn Waḥshīya has been published by Siggel.[24] It uses many mythical materials similar to those found in ibn Waḥshīya, Maimonides,[25] Shānāq, and other Indian sources.

There can be no doubt that the Indians had a very great influence on early Muslim writers on the subject of poisons. In this way an extensive knowledge of materia medica was transmitted. With each poison went prophylaxis, symptomatology, therapy, frequently the manner of its bodily operation, and the preparation and use of its antidote.[26] Although much of the Indian pharmacology was retained by the Muslims, the procedural elements together with the unique mixture of many important factual matters in a matrix of uncombed subjective ideas gave way quickly to the more objective and rational Greek ideas of medicine. This weeding-out process carried on by the early Muslim physicians was a difficult one which they performed with understanding and insight.

24 Siggel, A. *Das Buch der Gifte der Jābir ibn Ḥayyān*. Wiesbaden, 1958.

25 Steinschneider, M. Gifte und ihre Heilung, eine Abhandlung des Moses Maimonides . . . *Virchows Arch.*, 1873, *57*, 62-120.

26 Steinschneider, M. Die toxicologischen Schriften der Araber bis Ende XII Jahrhunderts. *Ibid.*, 1871, *52*, 340-375.

The Dentist

An engraving by Lucas van Leyden (1494-1533). New Haven, Yale Medical Library, Clements C. Fry Collection.

During the Middle Ages dentistry continued in the hands of ignorant and untrained charlatans. They offered their services in the marketplace and at carnivals where they might lure people afflicted with toothache. Dental treatment became a public spectacle at which the ignorance of the operator might be concealed by the arrogance of the quack.

Lucas van Leyden, a Dutch engraver, has portrayed an itinerant dentist of the sixteenth century examining the teeth of a patient while his "helper" is in the act of picking the patient's purse. The pained expression on her face may be due to the emptiness of the purse. The indifference of the operator is suggested by his attitude toward the patient. The inscription dates the etching at 1523.

The sham practitioner is nobly attired in an ornate robe and cap which is trimmed with teeth as trophies and proof of his competence. The brooch worn in his cap could either be the sign of a pilgrimage or possibly symbolic of his craft.[1] The outdoor setting suggests that the operator has set up a booth at a fair. On the table the artist has depicted ointments and percussion instruments used in locating the painful tooth. The customary diploma with official seal affixed announces the fame of the dentist and certifies to his competence.

The mood of the picture is one of satire on the exploitation of the omnipresent victim of toothache. That people who followed the occupation of dentist did not always enjoy an enviable reputation can be gathered from the fact that the French had an old adage: "Mentir comme un arracheur de dents"—to lie like a toothpuller.[2]

J.B.H.

1 Weinberger, Bernhard Wolf. *An introduction to the history of dentistry*. St. Louis, C. V. Mosby, 1948. 2 vols., vol. I, p. 229.

2 *Ibid.*

Notes and Events

Edited by Dorothy M. Schullian*

George Lindsay's Microscope

Among the many simple microscopes made in the eighteenth century there is no doubt that the one designed by George Lindsay is mechanically the most ingenious. Relatively few were made, and apart from specimens in the collections of the Royal Microscopical Society, the Science Museum, South Kensington, and the Museum of the History of Science, Oxford, it is almost unknown. It would therefore seem appropriate to illustrate and describe this microscope which was one of the first to be patented in England.

George Lindsay was a London watch and clock maker who worked at the sign of the Dial next to the Fountain Tavern which, in the eighteenth century, was near to where Catherine Street joined the Strand; now Catherine Street opens into Aldwych. He was a skilled craftsman who enjoyed the patronage of the Prince of Wales and obtained a Patent for his "generall portable microscope" on 17 February 1742/43. Although he invented the instrument and commenced making it in 1728, it would appear that the few specimens which exist are dated 1742 or 1743. It is possible that most of his production occurred after the issue of the Letters Patent, but it seems certain that his output was limited by a number of extraneous factors. The most popular of the simple microscopes was the screw-barrel type which had been invented by Carlo Antonio Tortona about 1685 and the optical system of which had been greatly improved by James Wilson about 1702. This instrument was made in large numbers by many makers including Edmund Culpeper and Edward Scarlett; Lindsay therefore had stiff opposition. By 1742 the simple microscope was being superseded by the compound one which gave better magnification and definition and was more convenient to use because of its greater working distance, but which was naturally less portable. In 1744 John Cuff designed his "new constructed double microscope" which was copied by makers in England and on the Continent and retained its popularity until the last years of the eighteenth century. The models made popular by Wilson and by Cuff almost certainly drove Lindsay out of the microscope market.

Whatever the reason for its present rarity, Lindsay's microscope was of extremely interesting design and very thorough workmanship. More commonly it was made of brass, but the Science Museum, South Kensington, has two specimens made in silver (Inventory numbers 1921-756 and 1951-277). As will be seen in Figure 1 the instrument consists of two right-angled frames placed one above the other. The lower of these comprises

* History of Science Collections, Cornell University Libraries, Ithaca, New York, 14850.

the baseplate and the eyepiece, while the upper one, which moves on the baseplate, has an adjustable upright with a spring-loaded stage to hold the objects to be examined. The upper frame also has a mirror fixed at one end which moves with it so that the mirror is always the same distance from the stage.

The upper frame is moved along a slot in the centre of the baseplate by means of an eccentric lever, well seen in Figure 2. On the back of the eyepiece is a slot in which a narrow brass slide containing three lenses can be inserted; two slides are provided with lenses numbered 2,3,4 and 5,6,7. Lens 7 is the highest power; lens 1 is contained in a Lieberkühn which also fits into the slot. On the side of the baseplate is a silver scale graduated from 1 to 7 which shows the position to which the stage must be moved to correspond to the focal length of each lens. A wing nut allows part of the stage to be removed so that objects held in forceps or aquatic specimens in tubes can be examined.

Attached to the baseplate is a folding, ornamental handle which in turn may be fixed to a rather flimsy stand which has a folding tripod footpiece.

Each instrument is numbered on the back of the eyepiece and is dated on the baseplate, the date being usually hidden by the bar to which the adjustment lever is attached (see Figure 2). A silver plate on the front of the microscope is engraved "Geo: Lindsay Inv. & Fec."

When closed the microscope is 2¾" long from eyepiece to mirror, 1⅛" wide, and 1$\frac{3}{16}$" high; the ornamental handle is 1¾" long. The instrument and its accessories fit into a leather-covered wooden case measuring 3" x 2¼".

The accessories are: (a) Two narrow metal slides each with three lenses numbered 2,3,4 and 5,6,7; (b) Lieberkühn with lens; (c) Lieberkühn without lens for use with higher power objectives; (d) Frog-plate; (e) Stage forceps with holder; (f) Metal case containing 6 ivory slides; (g) Collapsible tripod stand with turned pillar in two sections; (h) A small ivory or metal cylindrical box containing spare talcs and springs.

The example illustrated, numbered 46 and dated 1743, is in the writer's collection. It is incomplete, for it has only objectives 5,6,7 and the collapsible stand. A silver model in the Science Museum, South Kensington (Inv. no. 1921-756) is complete with all accessories in its original case.

The method of use is best given in Lindsay's own words:

Transparent Objects are generally confined between two Talks in Ivory Sliders, such as are in the Case. One of these being put into the Object Part [stage], the round Hole in the Brass Plate is a Guide to place the Object you would view before the Aperture [in the eyepiece]. Then having observed the Number of the Glass that is before the Aperture, and appears at the Top of the Head, if you move the Object-Part of the Leaver, till the Index comes on the Line under the same Figure on the Scale, which is on the Side of the Instrument, the Object will then be in a

Fig. 1. Shows the main features of the microscope. An ivory slide has been inserted into the stage to show the method of use.

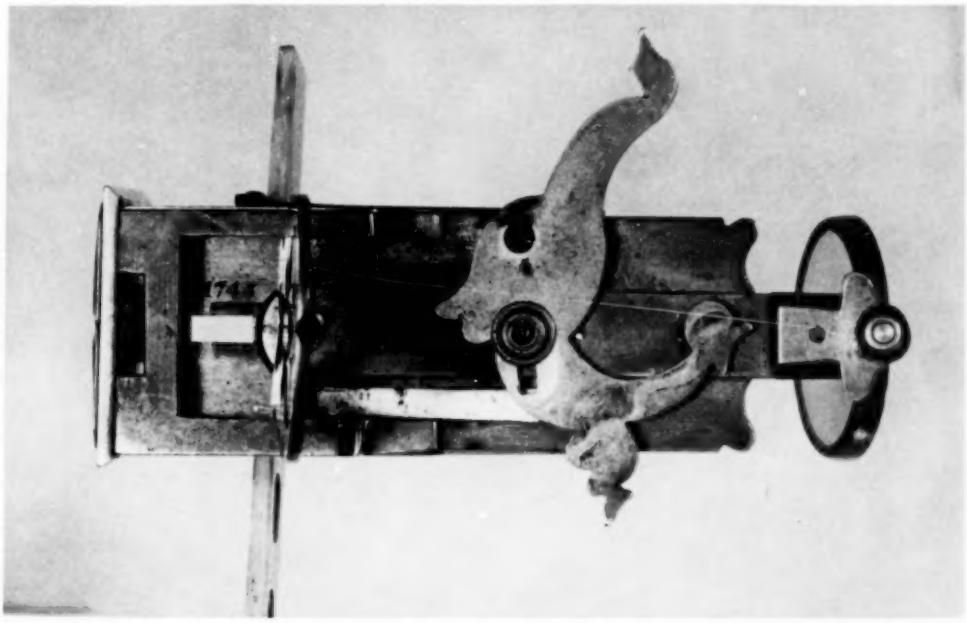


Fig. 2. The instrument from below, showing the adjustment lever, the sliding bar which carries both stage and mirror and the date.

Point of Vision, and by the minutest Touch at either End of the Leaver, the Object will be adjusted immediately to the Eye of any Person that is viewing it. If you think proper to make the Object bigger, put down the Brass Slider, till the next Figure comes even with the Top of the Instrument, and move the Object-Part nearer, till the Index is at the next Division on the Scale under that Figure, and so on.

REFERENCES

Brown, W. H. Patents connected with the microscope, 1666-1800. *J. roy. Micr. Soc.*, 1895, 257-273.

Clay, Reginald S. and Court, Thomas H. *The history of the microscope*. London, Charles Griffin, 1932.

Disney, Alfred N., Hill, Cyril F. and Baker, Wilfred E. W., Eds. *Origin and development of the microscope, as illustrated by catalogues of the instruments and accessories, in the collections of the Royal Microscopical Society*. London, Royal Microscopical Society, 1928.

KENNETH F. RUSSELL

Three Pioneers in the Study of Aphasia

The contributions of the three men whose life and work are briefly reviewed in this note form major landmarks in the early development of our knowledge of disorders of language. As it happens, all three—Johann Schmidt, Peter Rommel, and Johann A. P. Gesner—were German physicians. Schmidt and Rommel published about 1680, while Gesner published about 1770.

Johann Schmidt was born in 1624 in Danzig, practised medicine with great success there, and in due time attained the office of chief physician of the city. In 1673 he made observations on a case of aphasia which he published three years later under the title, *De oblivione lectionis ex apoplexia salva scriptione*. In the report he describes first a patient who showed a paraphasic disorder and a right hemiplegia after a stroke. "He substituted one word for another so that his attendants had difficulty in determining what he wanted." Both the paraphasia and the hemiplegia receded, but he was left with a complete alexia. "He could not read written characters, much less combine them in any way. He did not know a single letter nor could he distinguish one from another. But it is remarkable that, if some name were given to him to be written, he could write it readily, spelling it correctly. However, he could not read what he had written even though it was in his own hand." The patient never recovered from the alexia despite tutoring. However, in a second brief case report, Schmidt describes another alexic patient who did recover the ability to read.

As the title of Schmidt's paper implies, he considered the inability of the first patient to read script which he himself had just written to be the most noteworthy feature of the case. However, it must be noted that Schmidt was not the first to call attention to this phenomenon. Even before 1600, according to Meunier, Girolamo Mercuriale had made allusion to a patient he had seen who was dyslexic after an epileptic seizure. "And

yet it was astonishing that this man could write but could not read what he had written."

This report by Schmidt is a noteworthy contribution to the semiology of aphasia in several respects. It describes paraphasia, as distinct from simple motor aphasia in the sense of a mere quantitative reduction or impoverishment of motor speech; it provides a description of alexia which was somewhat fuller than those to be found in the previous literature; it calls attention to the now familiar phenomenon of at least partial conservation of the ability to write in cases of severe alexia; finally, by the comparison of the two cases it is shown that the course of an alexic impairment may vary from one case to another, the disability remaining unaltered in some and improving with rehabilitation measures in others.

Peter Rommel was born in Ulm in 1643. Taking the degree in medicine in Strasbourg, he went to Italy where he studied in Padua. He then returned to Germany and became *Stadtphysicus* in Ulm. He published a relatively large number of clinical observations, many of which are of neurological or psychiatric interest, e.g., *De paralysi singulari, De loquelae, memoriae, et rationis imbecillitate, De delirio melancholico.* Among these contributions is one published in 1683 under the title, *De aphonia rara.* It is a detailed description of a patient with a severe motor aphasia, including complete incapacity for repetitive speech. She could say only two words ("yes" and "and"). When asked to repeat a simple phrase such as "God will help" she would make strenuous efforts to comply but was unsuccessful. However, at the same time, her capacity for serial speech was preserved. She could recite the Paternoster, the Confiteor, various Biblical verses and other prayers, these being produced verbatim and without hesitation but somewhat precipitously. Yet if some short phrases to be found in these prayers were given to her to repeat, she was utterly unsuccessful. She appeared to retain considerable capacity for understanding both oral and written language.

Thus, Rommel presented a clinical picture in which the deficits and the preserved capacities of the patient with respect to language functions are fairly clearly delineated. He referred to his case as one which exemplified a "rare" form of aphasia, meaning thereby to call attention to the patient's preserved capacity for serial speech within the setting of severely impaired conversational and repetitive speech. Evidently this aphasic profile, now familiar enough, was one which he had not encountered before. Some 60 years later, the Swedish historian and littérateur, Olof Dalin, reported a similar case of a patient with a virtually complete motor aphasia, who nevertheless was able to sing certain hymns. Rommel, so far as we are aware, presented the first description of this clinical picture.

Johann Augustin Philipp Gesner was born in Rothenburg ob der Tauber in 1738. He studied medicine in Erlangen and upon the comple-

tion of his studies returned to Rothenburg to practise. He was a prolific writer on medical subjects, among his contributions being a five-volume work entitled *Samlung von Beobachtungen aus der Arzneygelahrheit und Naturkunde,* published during the years 1769-1776. In the second volume there is a chapter of about 75 pages entitled *Die Sprachamnesie.* In this chapter, Gesner presents a number of descriptions of cases of aphasia, derived either from his personal observation or from the literature, and on the basis of this review he presents a theoretical discussion of the psychopathology of aphasia. The most outstanding feature of the case reports is the detailed and vivid description of characteristics of jargon aphasia which includes a number of new observations. For example, jargon agraphia in a patient with jargon aphasia is described, and Gesner points out that some of the "neographisms," so to speak, of the patient showed a phonetic correspondence with the neologisms which he uttered. Differential impairment in reading Latin as compared with German in educated dyslexic patients is also described.

But perhaps the most important of Gesner's contributions is his discussion of the impairment underlying these aphasic disorders. He attributes these language deficits not to a general intellectual decline or a general loss of memory but to specific impairment in verbal memory. This impairment in memory consists in the inability of the patient to associate images or abstract ideas with their conventional linguistic signs. Under ordinary circumstances, this rupture in the associative bonds between thought and symbol results simply in the patient not expressing himself. However, when the idea which he has in mind is an extremely vivid one and he feels a strong need to express it, an inaccurate association between thought and verbal symbol is made so that paraphasic or neologistic speech is uttered. Thus paraphasia or jargon aphasia reflects a forgetting of speech rather than an impairment in thinking or understanding. The structural basis for these disorders is disease of the brain which causes a weakness or inertia between the different parts of that organ.

It is evident that Gesner's work represents an important landmark in the development of our knowledge of aphasia. His clinical descriptions, particularly one lengthy description of jargon aphasia, were cited by a number of later writers. His "associationist" theoretical conceptions, which are admittedly rather vague, may be designated as being the first statement of a modern theory of the aphasic disorders.

There were, of course, a number of other important early observations on aphasia. Yet it is not unfair to state that, taken in their totality, the contributions of these three men constituted a very large part of the knowledge of aphasia which existed in 1800.

ARTHUR L. BENTON
ROBERT J. JOYNT

REFERENCES

Benton, A. L. and Joynt, R. J. Early descriptions of aphasia. *Arch. Neurol.* 1960, *3*, 205-222.
Dalin, O. Berättelse om en Dumbe, som kan siunga. *K. Swenska Wetensk. Acad., Handlingar*, 1745, *6*, 114-115.
Gesner, J. A. P. *Samlung von Beobachtungen aus der Arzneygelahrheit und Naturkunde*, Nördlingen, C. G. Beck, 1769-1776. 5 vols.
Meunier, Léon. *Histoire de la médecine*. Paris, 1924, p. 524.
Rommel, P. De aphonia rara. *Miscellanea Curiosa Medico-Physica Academiae Naturae Curiosorum*, 1683, 2 (2d ser.), 222-227.
Schmidt, J. De oblivione lectionis ex apoplexia salva scriptione. *Ibid.*, 1676, *4*, 195-197.

Peonies, 'Peckers, and Prolapsus Ani

When Nicholas Culpeper translated the *Pharmacopoeia Londinensis* from the Latin into English, he was critical of the astrological matters contained therein. The Royal College's instruction for *Oxymel scilliticum* was that it must be "set in the rays of the sun forty days to wit twenty days before and after the rising of the dogstar." Culpeper commented, "And what then is our learned College to write of astronomy which is a science they have not much skill in."

Another example concerns *Aqua pœoniæ composita* which first appears in the second edition of the *Pharmacopœia,* published in 1650. The entry is: "Radicum Pœon. Maris debitè collectarum unciæ duæ semis"; Culpeper translated "infuse again male Peony roots gathered in due time." He commented, "And that is they know not when: If you will bee precise in your time, let it be in the hour and day of the Sun, he rising in the Lion and the Moon applying to his Trine or Coniuntion."

It is not generally realized that gathering peony root was once thought to be every bit as dangerous as gathering the legendary mandrake. Theophrastus (c.372-288 B.C.) wrote, "They say that the peony . . . should be dug up at night, for, if a man does it in the day-time and is observed by a woodpecker while he is gathering the fruit, he risks the loss of his eyesight; and, if he is cutting the root at the time, he gets *prolapsus ani.*" Gerarde refers to the matter in his *Herball* (1633):

> Moreouer, it is set downe by the said Author [Josephus], as also by *Pliny* and *Theophrastus,* that of necessitie it must be gathered in the night; for if any man shall pluck off the fruit in the day time, being seene of the Wood pecker, he is in danger to loose his eies; and if he cut the root, it is a chance if his fundament fall not out. The like fabulous tale has been set forth of Mandrake. . . . But all these things be most vaine and friuolous: for the root of Peionie, as also the Mandrake, may be remoued at any time of the yeare, day or houre whatsoeuer.

The College authorities apparently did not accept Gerarde's opinion though it was published 17 years before the second edition of the *Pharmacopoeia.*

The passage in Josephus's (first century A.D.) *Wars of the Jews* is of interest. He speaks as follows of Baaras, which Gerarde clearly identifies with peony:

Its colour is like to that of flame and towards the evenings it sends out a certain ray like lightning; it is not easily taken by such as would do it, but recedes from their hands, nor will yield itself to be taken quietly until either the urine of a woman or her menstrual blood be poured upon it; nay, even then it is certain death to those that touch it, unless anyone take and hang the root itself down from his hand and so carry it away. It may also be taken another way, without danger, which is this: They dig a trench quite round about it, till the hidden part of the root be very small, they then tie a dog to it, and when the dog tries hard to follow him that tied him, this root is easily plucked up, but the dog dies immediately, as if it were instead of the man that would take the plant away; nor after this need any one be afraid of taking it into their hands. Yet after all these pains in getting it, it is only valuable on account of one virtue it hath, that if it be only brought to sick persons, it quickly drives away those called demons, which are no other than the spirits of the wicked, that enter into men that are alive and kill them, unless they can obtain some help against them.

But this is really the mandrake legend.

WILLIAM BROCKBANK
ANDREW B. SCOTT

REFERENCES

Culpeper, Nicholas, *Pharmacopœia Londinensis: or the London dispensatory*. . . . London, Printed by a Well-wisher to the Common-wealth of England, 1654, p. 130.

Gerarde, John, *The herball*. London, Adam Islip, Joice Norton and Richard Whitakers, 1633, p. 983.

Josephus, Flavius, *The wars of the Jews*. London, J. M. Dent (Everyman Edition), 1936, pp. 454-455.

Royal College of Physicians, *Pharmacopœia Londinensis*. 2d ed. Londini, Typis G. Du-gard, impensis Stephani Bowteil, 1650, p. 33.

Theophrastus, *Enquiry into plants* . . . , with an English translation by Sir Arthur Hort. London, William Heinemann (Loeb Classical Library), 1916, vol. 2, pp. 256-257 (IX.8.6).

Baumgartner-Fulton 5: A Corrigendum

Baumgartner and Fulton in their admirable bibliography of Fracastoro's Syphilis (New Haven, Yale Univ. Press, 1935) state à propos their no. 5: "The early bibliographers of Fracastoro all list an edition of *Syphilis* published in Paris in 1539 in 16° which was quite independent of Ferri's *De ligni sancti medicina* with which it was issued in the following year." The National Library of Medicine has recently acquired an edition of Ferri's work agreeing in almost every detail with the 1540 edition described by Baumgartner and Fulton (their no. 6), but dated 1539. The few discrepancies are unfortunately to be attributed to errors in the original transcription of no. 6 by Baumgartner and Fulton. Line 10 reads: ¶ [paragraph mark] Indice rerum . . . , not C[*um*], and the imprint runs as follows: PARISIIS./Vęneũt in vico Iacobęo a Ioan/ne Foucherio sub scuto Florẽtię / Cum priuilegio. / 1539 (cf. Baumgartner-Fulton: Foucher [sic] and Florętio [sic]). Type-setting and collation are identical: the 1540 "edition" is therefore simply a re-issue differing solely in date.

The above discovery suggests (though it does not prove) that there was in fact no separate issue of Fracastoro's Syphilis by Foucher in 1539.

MAY G. HARDY
RICHARD J. DURLING

Maccabaean Prize and Medal

Entries for the 1964 Maccabaean Prize and Medal, Faculty of the History of Medicine and Pharmacy, The Worshipful Society of Apothecaries of London, are now invited for an essay of 5,000 to 7,000 words on some aspect of the history of medicine or pharmacy. Candidates must be under 30 years of age on 15 March 1964. Further particulars may be obtained from the Hon. Secretary of the Faculty, Dr. F. N. L. Poynter, The Wellcome Historical Medical Library, The Wellcome Building, Euston Road, London, N.W. 1.

Dutch Society for the History of Medicine

On the occasion of the 50th anniversary meeting of the Dutch Society for the History of Medicine and Science (Genootschap voor de Geschiedenis der Geneeskunde, Wiskunde en Natuurwetenschappen), which was held at Gorinchem on 8 and 9 June, medals were awarded to Dr. E. D. Baumann for his writings on the history of medicine, to Dr. Maria Rooseboom for her work as a long-time council member of the Society and her merits in developing the National Museum for the History of Science at Leiden, and to Professor Frans Verdoorn for the establishment and development of the new Biohistorical Institute of the University of Utrecht, in which the former Chronica Botanica Library & Archives have been incorporated.

Dr. George Rosen Appointed Visiting Professor at Yale

Dr. George Rosen, Professor of Public Health Education and Chairman of the Department at the School of Public Health and Administrative Medicine, Columbia University, while on sabbatical leave during 1963-1964, is Visiting Professor of the History of Medicine in the Department of the History of Science and Medicine at Yale University. He is teaching a survey course in medical history to undergraduate students and another to medical students; during the second semester he will offer a seminar on the history of research in the medical sciences.

American Association for the History of Medicine

The Thirty-Seventh Annual Meeting of the American Association for the History of Medicine will be held in Washington, D.C., and Bethesda, Maryland, 30 April–2 May 1964. All who wish to present papers are requested to send titles and brief abstracts (up to 200 words) to the chairman of the program committee, Dr. Jeanne Brand, National Institute of Mental Health, 6917 Arlington Road, Bethesda, Maryland, 20014. Titles and abstracts must be submitted before 15 January 1964.

Book Reviews

RICHARD HUNTER AND IDA MACALPINE. *Three Hundred Years of Psychiatry 1535-1860.* New York, Oxford University Press, 1963. xxvi, 1107 pp., 204 illus. $13.45.

Reviewed by ERIC T. CARLSON, *Clinical Associate Professor of Psychiatry, Cornell University Medical College, New York, New York.*

WHAT a magnificent book this is. Handsomely bound and beautifully printed, it appears smaller than its 1,107 pages might suggest. It is the product of that English family team of Richard Hunter and Ida Macalpine, psychiatrists of long-standing reputation for research in the history of their field and for their work in republishing significant documents from the past. As the subtitle of the current work indicates, it is "A History Presented in Selected English Texts." The authors of the selections are consequently mostly British, although there are examples from American writings as well as some translations of French and German authors. Drs. Hunter and Macalpine have cast their nets widely in bringing this collection into being. Writings of psychiatrists abound in it, but included also are legal documents, relevant works of theologians, philosophers, literary men, and patients themselves. Documents were chosen from both published and unpublished sources in an attempt to portray psychiatry as it existed during the three centuries covered by the book. The writers have apportioned their selections so that 5 per cent is devoted to the sixteenth century, 20 per cent to the seventeenth century, 27 per cent to the eighteenth century, and 48 per cent to the nineteenth century. Many of their choices come from areas which are essentially unexplored. This represents one of the values of the book, as it gives bibliographical leads which I am sure will come as a surprise to many readers and researchers. Each selection has an introduction by the editors, and they are to be congratulated for the usefulness of these corollary writings. These individual introductions provide additional information about the texts and put each into its proper relation to the developments of the time and to future trends. Just the reading of these separately provides a tremendous amount of information about the history of psychiatry.

This book will obviously become a standard library reference work. It will also be treasured by psychiatrists who wish to have the enjoyment of reading about what some of their predecessors thought. Indeed, it will have appeal to historically minded students of all kinds. To the researcher the book will naturally bring certain frustrations. All anthologies are open

to attack because of their tendency toward a broad base of selection—there is never enough about one's own favorite theme. But this is a generic not a specific criticism. One has to be careful about using the sectional headings of this volume, for they are a mixture of contemporary terms and those of the times of the original publications. The earlier works are printed in their original antiquated style, which makes them more authentic and quaint, but this probably will not be appreciated by many of those who will read the book. There are some errors of fact (for example, the date of discovery of morphine and the first major operation under hypnotic anaesthesia) but these are few and are small in proportion to the vastness of the subject matter which has been covered. Use of the book has been greatly facilitated by a table of contents and by two indices. The first (names) is quite complete and the other (subject matter) is certainly good, although far from complete for a book with as many topics as this; one will search in vain, for example, for the concepts of etiology or cause of insanity in the index. But these are only minor objections to a book that will be gratefully received by many people.

W. K. C. GUTHRIE. *A History of Greek Philosophy,* Vol. I. New York, Cambridge University Press, 1962. xv, 539 pp. $10.00.

Reviewed by JERRY STANNARD, *Research Associate, Department of History of Science and Medicine, Yale University.*

THIS multi-volume study, as judged by the first volume, promises to be of major importance for two reasons. It will be, first of all, the most significant contribution to our knowledge of Greek philosophy as a whole since Zeller's *Die Philosophie der Griechen.* Secondly, it will be equally important from a methodological point of view, for it codifies the appropriateness of the research carried on by many scholars in disciplines ancillary to the study of Greek philosophy *in se.* This means primarily, for the readers of this *Journal,* that the results obtained by medical historians such as Deichgräber, Edelstein, Wellman, and others are now incorporated into the modes of classical scholarship.

In a panoramic general introduction, Guthrie emphasizes a point which has gradually gained currency in the past two decades. *Philosophia,* in the earliest sense of the term, covered the entire domain of human intellectual activity. When rational, organized thought emerged from the mists of mythology is not easy to determine. But that it *had* emerged by the sixth century B.C. is well documented by the fragments of those writers examined here. The book is divided into five parts, dealing respectively with the Milesian School: Thales, Anaximander, and Anaximines (pp. 45-145); Pythagoras and the Pythagoreans (pp. 146-340); Alcmaeon (pp.

341-359); Xenophanes (pp. 360-402); and Heraclitus (pp. 403-492). An eleven-page bibliography and two indices conclude the volume.

Reverting to a view now somewhat out of fashion, the hylozoistic interpretation of the Milesians is defended. This has an important bearing on the interpretation of those fragments in which water is stated to be the *archē* of life. Apropos of this, Sherrington's remark that "water is the great menstruum of 'life'" is quoted with approval (p. 71).

The tendency to re-examine some of the more traditional interpretations of the presocratics is continued in the remaining chapters which are marked by a blend of conservative judgment and exemplary scholarship. Thus, the well-known Pythagorean taboos in the eating of flesh and beans are explained as relics of a much older belief in the kinship of all life (p. 186) instead of relying on anachronistic physiological explanations. The key to understanding the few remaining fragments of Alcmaeon, whose medical lineage was noted by Diogenes Laertius (viii, 83) lies in the fact that he is "already writing in the spirit of the Hippocratic treatise On Ancient Medicine. . . ." (pp. 344-345). As evidence of this, as well as the contention that Alcmaeon made use of observational data, Guthrie cites not only the well-known passage about *poroi,* by which he "may have intended nerves" (p. 349), but also calls attention to a parallel between Alcmaeon's explanation of sleep and Aristotle's (*Hist. An.*, 521a15).

The interaction between presocratic and Hippocratic writings is again emphasized when it is suggested that the unnamed person who likened the "universal unity" to earth (Hippocrates, *De Nat. Hom.*, VI,32 Littré) refers to Xenophanes (p. 384). This very interpretation, it may be noted, was later put forward by Sabinus and explicitly denied by Galen, who stated rather sharply that he found no evidence for this, not even in Theophrastus' epitome (XV,25 Kühn).

Heraclitus' aphoristic pronouncements have always been a stimulus to later thinkers to find therein anticipations of their own philosophical beliefs. Guthrie is no exception, for he suggests that Heraclitus had a dim foreshadowing of the truth which was later formulated explicitly by Protagoras, that each man is the judge of his own sensations (p. 431). It is difficult to defend this interpretation, however, if one accepts as genuine the so-called "river" fragments (i.e., "one cannot step twice into the same river," etc.), for these have traditionally been interpreted as advancing the belief that all of our sensations, indeed, the physical world as a whole, are in a constant state of flux. If taken literally, as Plato later was to argue, this would mean that one could not even speak of sensations as one's own.

But whether in all cases Guthrie be right or no, is of less moment than the fact that, by uniting the results of classical scholarship in all of its domains, he has created a monument which will probably not be surpassed within our lifetime.

W. P. D. WIGHTMAN. *Science and the Renaissance.* New York, Hafner Publishing Co., 1962. 2 vols. vol I: xv, 327 pp., 8 illus., vol. II: xix, 293 pp., 8 illus. $13.00.

Reviewed by ALLEN G. DEBUS, *Assistant Professor of the History of Science, Department of History, University of Chicago.*

DR. Wightman's *Science and the Renaissance* represents a significant contribution to our understanding of a most complex era. Covering the period from the Western invention of printing to about 1600, the author has based his work on the early scientific books at the University of Aberdeen. While at first this might seem somewhat arbitrary, the reader becomes aware of the importance of the Aberdeen collection when he opens the second volume of this set which is subtitled *An Annotated Bibliography of the Sixteenth Century Books relating to the Sciences in the Library of the University of Aberdeen.* Here close to 800 items are listed which give an impressive view of the depth of the Renaissance sources available there to the scholar. No one would question the value of publishing such bibliographies. However, it remains true that the average visitor to the United Kingdom seeking sixteenth century scientific published sources rarely will be required to travel any farther North than Euston Road.

On the book jacket one reads that the "nucleus" of the work is the bibliography (volume 2) and that volume 1 merely "provides the background to the bibliography, tracing the growth of scientific ideas in the Renaissance." While I am more than willing to grant the permanent value of having the Aberdeen holdings so conveniently listed, I would prefer to emphasize the first volume here. It should be borne in mind that Wightman's discussion of Renaissance science has been designed as an introduction to special studies of the period. As a result the better known aspects are rather lightly treated, while proportionately greater space is devoted to less well known themes. This is seen strikingly in the fact that almost as much space has been given to George Ripley's *Compound of Alchymy* as to the work of Vesalius. To some this may seem like rank heresy, but in effect we have here a welcome change from the familiar emphasis on the Copernicus-Tycho-Kepler sequence on the one hand and the Vesalius to Harvey sequence on the other. While Wightman surely does not deny to these individuals their rightful place in the development of modern science, his willingness to grant more space than usual to relatively neglected figures brings forth the significance of the "pseudo-sciences" in this period.

Above all—although Wightman doesn't state it in so many words—one becomes aware that an important key to the understanding of Renaissance science is an appreciation of the alchemy and chemistry of the period. Quoting from Melanchthon's *Initia Doctrinae Physicae* he shows (p. 149) that the author's Aristotelian definition of "Physics" reduces

largely to our "Chemistry" and that these two terms cannot properly be separated if we are to judge fairly the science of the sixteenth century. Similarly, he emphasizes the fact that the "physics" of the period was the basis of the study of medicine. Wightman might well have turned to the work of the English Paracelsian R. Bostocke (1585) who equated the study of nature with true medicine and then went on to state that this in turn is nothing other than alchemy. Seen in the light of such a definition the study of medicine (or alchemy) in the Renaissance takes in the whole of our "science." The importance of Renaissance medical works is heightened by the fact that almost all who might have any claim to the title of "scientist" in that period were physicians, and Dr. Wightman states (p. 208) that "I believe much renaissance thought significant for the subsequent history of science is buried deep in the books on various aspects of medicine which poured forth from the press in our period." Surely strong support for this generalization may be seen in the remarkable development of aqueous analytical methods in chemistry carried out by physicians in the late Middle Ages and the Renaissance—an advance until recently thought to have been an innovation of Robert Boyle (see the reviewer's "Solution Analyses Prior to Robert Boyle" (*Chymia,* 1962, *8,* 41-61).

Recognizing the far-flung domain of Renaissance medicine it is something of a disappointment to find that the chapter devoted to "Medicine and Chemistry" is centered primarily on the war of ideas involving the introduction of new medicines—the conflict of the "Paracelsians" and the "Galenists." Here the author presents a particularly clear-cut account of a very complex question and rightly points out that many of the most prominent iatrochemists were strongly anti-Paracelsian in their statements. However, this "war of ideas" extended far beyond the bounds of pharmacy and became part of the more general conflict between the mystical alchemical world view and the new science of the seventeenth century.

In his final chapter titled "The Embodiment of the Spiritual World" Wightman discusses the mystical universe of the sixteenth century and makes a plea that in the future this be given the same attention that the growth of the mathematical approach to nature has been given in the past.

> Is it therefore too much to suppose that the mystical strain so characteristic of Renaissance thought had as important a part to play in the final establishment of 'Natural Philosophy' as the more abstract geometrisation of Galileo? This enquiry has as yet been too little cultivated. The labour will be immense, but the value of the results might well be commensurable; for they may help to reveal how shabby has been the betrayal of those great men of the Renaissance who, while enlarging Man's vision of the universe, still regarded it with wonder and awe (p. 302).

This chapter—and the book as a whole—should serve as a needed antidote for all those who persist in using the term "mysticism" in Renaissance science in its most unpleasant modern connotation. In conclusion, it is the reviewer's belief that Wightman's work is an indispensable one for all those interested in the science and medicine of the opening stages of the Scientific Revolution.

FRANCISCO GUERRA. *Nicolas Bautista Monardes: Su vida y su obra [ca. 1493-1588]*. Mexico, D. F., Compania Fundidora de Fierro y Acero de Monterrey, S. A., 1961. 226 pages. $12.50.

Reviewed by THOMAS HERNDON, *Department of the History of Science and Medicine, Yale University.*

NICHOLAS Monardes was one of the outstanding physicians, botanists, and pharmacologists of sixteenth century Spain. He was the first to bring to the attention of the Old World the therapeutic possibilities of the plants of the New World. Aware of Monardes' interest in botany, the Spanish captains engaged in trade with the New World brought him so many plants from Spanish America that Monardes established a museum to house his collection in Seville—the first such museum in Western Europe. This museum, in addition to his writings, led to the eventual acceptance of many new drugs into the pharmacopeias of the Old World. Many of these drugs still may be found in the standard pharmaceutical dispensatories of today, often with the identical uses recommended by Monardes.

The primary purpose of Monardes in his writings is to present and describe the medicinal value of new material. In his major work, *Diálogo llamado pharmacodilosis,* he issues the first accounts of balsam of Peru, balsam of Tolú, jalap, sabadilla, sassafras and other plants thought to contain medicinal properties. His description of the use of tobacco for smoking by the natives of Spanish America resulted in the subsequent popularity of that practice in Europe. The *Diálogo del Hierro* is the first independent treatise on the therapeutic possibilities of iron and its derivatives, while his *Tractado de la Nieve* explains the water cycle and the medical uses of snow and cold water. Although the treatises on iron and snow abound in references to ancient, medieval, and early modern authors and their works, the *Pharmacodilosis* displays the more critical judgment of the author based on empiricism and observation. Monardes' works contain few references to the supernatural or to theological influences, but the author exhibits a certain credulousness in his delineation of the curative powers of items such as the bezoar stone.

That Monardes' writings were well received in his own day is indicated by the fact that by the end of the sixteenth century they were translated from the original Spanish, in whole or in part, into Latin, Italian, French, and English and totaled thirty-two editions. From 1689-1895, no editions or

translations of his works appeared. Indeed, in many modern histories of pharmacy or medicine, he is not mentioned or is referred to only casually. In recent years, however, numerous articles on Monardes have been written, chiefly by Spanish or Latin-American authors, and at least three biographies have been published, those by Joaquín Olmedilla y Puig (1897), Francisco Rodríguez Marín (1925), and now that of Francisco Guerra.

Guerra discusses Monardes' life, financial ventures, medical theories, scientific contributions, and writings. In addition, he lists eight manuscripts and fifty printed editions of Monardes' works. For each of the latter, Guerra offers a rather full bibliographical analysis. Facsimiles of title-pages of editions are reproduced at the end of the book. Indexes of documents and illustrations, a bibliography, and lists of symbols and abbreviations used by the author complete the book.

Those readers who are familiar with Guerra's other writings will recognize in this study the usual efficient scholarship of the author. Although the lack of a complete general index and a more systematic treatment of Monardes' sources detract somewhat from the value of the book, it is well organized, extremely interesting, and a real contribution to medical history. Medical historians, bibliographers, and the general historian of science and culture, particularly that of the sixteenth century, will welcome Guerra's treatment of one of the founders of the modern science of pharmacognosy. On the whole, Guerra has produced an excellent study of Monardes, and one that has been greatly needed.

BRUNO KISCH. *Gewichte- und Waagemacher im Alten Köln (16.-19. Jahrhundert)*. Köln, Verlag der Lõwe, Dr. Hans Reykers, 1960. 180 pp., 50 illus.

Reviewed by CURT PROSKAUER, *Curator, Charles H. Land Museum, Columbia University, School of Dental and Oral Surgery, New York, New York.*

PUBLICATION No. 36 of the Department of the History of Medicine of Yale University, New Haven, Connecticut, is the work of Dr. Bruno Kisch, Professor Emeritus of the University of Cologne, now Curator of the Edward C. Streeter Collection of Weights and Measures at Yale University.

Dr. Kisch, for many decades deeply interested in the history of scales and weights, gives an account of their development in various countries—the materials used, their different shapes, their historical and commercial roles from early days until the nineteenth century. The author offers convincing evidence that the scales produced in Cologne to set weight standards for money and various other objects played an important part in western European trade.

Dr. Kisch describes—with the aid of six illustrative plates—the hallmarks of Cologne's master scalesmiths and apothecary weight makers, also the

hallmarks of the craftsmen who build the chests in which the scales were kept. The author copied all of these 109 hallmarks by hand.

An appendix gives the regulations of the various master scale and weight makers' guilds, very important documents. The book concludes with 50 photographs of the various types of scales, weights and cases, most of them inscribed by the master craftsmen. Dr. Kisch's work covers everything related to his subject: history of civilization, politics, handicrafts, commerce, medicine, pharmacy, and applied arts.

AKOS PALLA *et al.*, Eds. *Nymphis Medicis.* Budapest, Medimpex, 1962. 143 pp. 70 illus.

Reviewed by EDWIN CLARKE, *The Wellcome Historical Medical Library, London, England.*

THIS is a collection of 76 unique and excellent photographs, 25 in color, accompanied by legends of the same quality in English. The editors' brief introduction indicates their purpose: "The pictures published here —several of them for the first time—show, without striving for chronological order, some of the Hungarian relics and curiosities of medical history (which are not always of Hungarian origin), as a modest contribution to the systematic and world-wide treatment of the subject." The objects selected include sculpture (the book's title is taken from a votive altar dedicated to the sacred healing nymphs), mosaics, pottery, glass-ware, furniture (including Semmelweis' wash basin), books, instruments, etc.; most remarkable of all is the embalmed son of a nineteenth century professor of morbid anatomy.

The editors are to be congratulated on producing a useful and attractive contribution to the pictorial aspects of medical history. The presence of four legends in Russian in the copy examined presumably indicates that there is also a Russian edition.

VICENTE PESET. *La Psiquiatría de un Medico humanista: (Francisco Valles, 1524-1592).* Madrid, Archivos de Neurobiología, 1961. 95 pp. Private distribution.

Reviewed by F. GUERRA, *Fellow, The Wellcome Trust, London, England.*

AFTER a long series of studies on Spanish psychiatry Peset now concentrates on Philip II's physician, Valles "the divine." The first part of his monograph describes the general trends in sixteenth century humanism among the Spanish medical profession, aimed at the renovation of Greek knowledge and research in fields quite outside their province. Peset then analyses Valles' commentaries on two clinical cases taken from Hippocrates' Book of Epidemics.

The psychiatric syndromes surveyed by Valles' commentaries give an excellent cross-section of Renaissance psychiatry and show close similarities between past and present nosology, concepts, problems, and clinical approach. Peset's study is both deep and erudite and allows an excellent survey of the best period in the peninsular medicine. However, the specialized psychiatric lexicon and the literary style of the Spanish language point out once more the difficulties facing medical historians in achieving a wider audience for their current literature.

MANFRED FREY. *Friedrich Miescher-His und sein Beitrag zur Histopathologie des Knochens.* Basel, Benno Schwabe and Co., 1962. 112 pp., illus. Sw. Fr. 16.–

Reviewed by LOWELL E. NOLAND, *Professor of Zoology, Department of Zoology, University of Wisconsin, Madison, Wisconsin.*

THIS memoir covers the life of Friedrich Miescher (20 pp.), an evaluation of his treatises on bone structure and healing (46 pp.), a brief account of his lesser investigations (8 pp.), letters and other source material (21 pp.), Miescher's address on Haller (32 pp.), and two pages of bibliography.

The biographical section tells of his birth (1811) at Walkringen, Switzerland, his attendance at Biel Gymnasium, where Agassiz studied shortly before, his two medical years at Bern and four (1832-1836) under Johannes Mueller in Berlin, where in 1836 he published his two major medical works, *De ossium genesi, structura et vita* and *De inflammatione ossium eorumque anatome generali.* Returning to Switzerland he declined a position at Bern and accepted a professorship in anatomy and physiology at the small, struggling medical school at Basel. Having no students at first, he spent the winter of 1838-1839 in Paris with Magendie and Nordmann, the latter arousing in him an enduring interest in parasitology. In1843 he married Antonia His, older sister of Wilhelm His, later embryologist at Leipzig. In 1844 he accepted a professorship at the Hochschule in Bern, amid political controversies about his appointment, and served until 1850, when he returned as professor of general pathology to Basel and there spent the rest of his life. He was active in Swiss scientific societies, organized a Basel medical society for local physicians, and served as rector of the University for a time. He was a music-lover, played the lute, and sang leading roles in local choral productions. He had a large medical practice and in 1871 gave up his professorship, but continued to give some lectures. He died of heart disease in 1887.

His accurate descriptions of finer bone structure and the histology of fracture-healing in his 1836 treatises were his main contributions to medical science. He was first to distinguish and carefully describe hyaline, elastic, and fibrous cartilage. His conclusions that ossification was always preceded by cartilage, which was then directly transformed into bone by calcifica-

tion, and his belief that callus formation is always from the broken ends of bone and not from the periosteum are subject to some modification today, but were logical inferences for his time. Bacterial infection was not then understood, and he thought that suppuration was caused by mechanical interference with circulation at the point of breakage. He was first to describe resorption of bone in the healing of fractures.

Among his minor contributions were observations and lectures (never published) on liver and bladder cancer, congenital malformations, small publications on a bird trematode (*Monostoma bijugum*), a fish tapeworm (Tetrarhynchus), and a human skin mite (Demodex). In mouse muscle he discovered the spore sacs of Sarcocystis, still called Miescher's tubes. He published little during his life, but exerted a strong influence in the resurgence of the Basel medical school and on the practice of medicine through his students.

He was also a medical historian, and gave three major addresses in this field: one on Felix Plater, one on the history of the University of Basel, and one on Albrecht von Haller, a 32-page gem of biography published in full in this memoir for the first time.

ALLEN O. WHIPPLE. *The Story of Wound Healing and Wound Repair.* Springfield, Ill., Charles C Thomas, 1963. 135 pp. $5.75

Reviewed by EDWIN CLARKE, *The Wellcome Historical Medical Library, London, England.*

EXTENSIVE, first-hand experience of a special aspect of medicine is the most important qualification for the person who wishes to write its history. But he must know his limitations and, if necessary, restrict himself narrowly to the topic itself. Dr. Whipple, however, has decided to include a background of general medical history which on the whole lacks balance and perpetuates many errors. Furthermore, the background swamps the story of wound healing, which is itself inadequate. Thus in the chapter on "The Eighteenth Century," wounds are discussed on two pages, whilst 8½ pages deal with general medical history. The latter is based entirely on biographical material, and there is no mention of basic ideas and developments which may have influenced the growth of knowledge concerning wounds. The book ends, unaccountably enough, with "Halsted's residency training program" and "A brief discussion of the process of wound healing."

L. R. LIND. *Aldrovandi on Chickens.* Norman, Oklahoma, University of Oklahoma Press, 1963. xxxvi, 447 pp., 48 illus. $6.95.

Reviewed by MARGARET T. MAY, *Cornell University, Ithaca, New York.*

AMONG the works of the great Italian naturalist, Ulisse Aldrovandi, one of that splendid group of scholars who made the latter part of the

sixteenth century so brilliant a period in the history of the University of Bologna, is an *Ornithologia* in three folio volumes. Book fourteen in the second volume is devoted to the domestic fowl, and it is this section which has been translated and provided with an introduction and commentary by Dr. L. R. Lind of the Department of Classics at the University of Kansas. This is an important work; as Dr. Alessandro Ghigi, Professor Emeritus of Zoology at the University of Bologna, points out in his admirable foreword, it is a prime source of information for determining the age of our modern breeds and for our knowledge of pre-Linnaean classification. Moreover, it contains the first published illustrations of the reproductive tract of the hen, which are excellent for their time and which are accompanied by Aldrovandi's account of his daily inspection of incubated eggs. This and a similar account by Volcher Coiter are the first since Aristotle's and mark the beginning of modern experimental embryology.

These positive and highly commendable achievements of Aldrovandi's are buried in a mass of miscellaneous lore. The hold of scholasticism was strong upon him, and no old tale or allusion to the domestic fowl was too insignificant or too misty and unfounded to escape inclusion. Socrates' cock to Aesculapius and the symbolism of the cock that crowed after Peter's denial of Christ are there; hairy chickens are described, chickens covered with white wool, bearded chickens, chickens that never make a sound, and chickens that lay two and three times a day. No bone of contention is too dry to be worried anew and every long-drawn-out discussion is loaded with citation and textual criticism, reduced at times to absurdity.

Dr. Lind has written for this valauable and entertaining book an excellent, well-documented introduction, which will increase the reader's enjoyment. It would have been even better if it could have included a brief account of the University of Bologna in Aldrovandi's day. It is regrettable that the remainder of the book does not fulfill the promise of the introduction. The tracking down of the references—admittedly a long job —has been slighted. In all but a few instances those not given by Aldrovandi himself have been left untraced, and many of these (to Aristotle and Galen, for example) would have been relatively easy to find. The handling of those that are given by Aldrovandi is in the main satisfactory. It is the translation itself, however, which is the greatest disappointment. It was impossible in the time available to check it completely, but a spot-check was made of twenty-two pages chosen more or less at random, and on every page the same distressing faults emerged. Words and phrases are omitted, wrong meanings are chosen, and frequently the Latin is misconstrued. Only a few examples will be given:

On page 3 "authoremque" is omitted—"my guide *and pattern*;" on page 4, "verum"—"a *true* example;" on page 87, "uteri proportione"—

"surrounds the chorion and the yolk *like a uterus*;" and on page 198, "Non parum profecto"—"*Surely* this genus of birds should glory *no little* in the fact that," etc.

On page 91 "trivialis" should be rendered "common," not "trivial." The controversy over the order of formation of parts in generation, which is under discussion here, was certainly not considered trivial in Aldrovandi's time, but it was a very common one. And on the same page "in more detail" is not a proper translation for "brevius"—"more briefly."

On page 86 the translation reads, "Nature at the same time replaces the material of the living creature in the egg and supplies it with food as well for its growth, since the chick cannot do this for itself." The Latin reads, "Natura enim simul & materiam in ovo reponit & satis sibi ad incrementum. Cum enim avis intra se perficere nequeat, cibum una parit in ovo." The translation should read, "For Nature at once deposits in the egg both the material of the animal and sufficient [food] for its growth. For since a bird cannot perfect [its young] inside itself, it produces food too in the egg."

On page 95, where the egg tooth on the chick's beak has been described, the translation reads, "Nature, the most shrewd parent of creation, seems to have constructed this object in that place to prevent the beak or its veins, little membranes, or other quite tender little parts from being bruised." The Latin reads, "Sagacissima rerum parens natura id ibi fabricasse videtur, ut impediat ne rostello suo vel venulas, vel membranulas, vel alias quascunque tenerrimas particulas pertundat." Surely the translation should read, ". . . to prevent [the chick] from piercing with its little beak either the little veins or the little membranes [the amnion and vascular allantochorion] or any other very tender little parts."

On pages 97-98, where the yolk sac still persisting in the abdomen of a chick ten days after hatching has been described, the translation reads, "Two vessels are implanted in this tunic. One of these is an artery; its pulsation indicates that it proceeds from the heart." The Latin reads, "Tunicae huic duo vasa implantantur quorum unum arteriam esse, & a corde proficisci pulsus indicat." The translation should of course read, ". . . its pulsation indicates that one of these is an artery and proceeds from the heart."

Such errors on the part of a person of Dr. Lind's qualifications can only mean undue haste and a lack of that meticulous checking which alone can eliminate them from a manuscript. It is a pity that scholars must be warned to check with the original any translations they wish to use from this book.

T. Doby. *Discoverers of Blood Circulation. From Aristotle to the Times of Da Vinci and Harvey.* New York, Abelard-Schuman, 1963. 285 pp. $6.50.

Reviewed by Edwin Clarke, *The Wellcome Historical Medical Library, London, England.*

It is claimed that this book is comprehensive and authoritative, that it will be appealing to all—including "the more mature historian of medicine"—and that it is written by a person with an acute sense of historical perspective. Unfortunately it is none of these.

The author has attempted to give an account of the men who have made important contributions to our knowledge of blood circulation, ranging in time from Aristotle to Malpighi. At the same time, he supplies a background of general and medical history which certainly enhances the perspective of the story. However, an adequate balance is not always achieved, and often the central theme is partially or completely submerged. Moreover, this is not an outstandingly successful exposition of the history of the discovery of the circulation.

It would, for example, have been preferable to have dealt perhaps more fully and more accurately with the ideas of Aristotle, Erasistratus, and Galen rather than to give a disproportionate amount of biographical and non-medical information, despite its undoubted interest and importance. The Aristotelean concepts are given in the traditional manner and the recent re-interpretation by Fleming and Wilson of the ideas of cardiovascular function put forward by Erasistratus and Galen are not mentioned. Similar criticisms can be made of the later parts of the book; although it may be useful to have the individual's contribution and biography juxtaposed, most can be found elsewhere.

Throughout, there is not sufficient critical judgment, and the author is too willing to reproduce conjecture as established fact. It can be argued that without some speculation a reasonable story cannot be told; but if this is so, some attempt at least should be made in this type of book to separate fact from fiction.

BOOKS RECEIVED

Jameson, Edwin. *Gynecology and Obstetrics.* New York, Hafner Publishing Company, 1962. xv, 170 pp., 5 illus. $2.45.

Corvisart, J. N. *An Essay on the Organic Diseases and Lesions of the Heart and Great Vessels.* 1812. Jacob Gates, Trans. New York, Hafner Publishing Company, 1962. xiv, 344 pp. $2.75.

Krumbhaar, E. B. *Pathology.* 1937. New York, Hafner Publishing Company, 1962. xvii, 206 pp., 18 illus. $2.45.

Charcot, J. M. *The Diseases of the Nervous System.* 1881. New York, Hafner Publishing Company, 1962. xvi, 3 pl. $3.75.

Rush, Benjamin. *Medical Enquiries and Observations.* 1812. New York, Hafner Publishing Company, 1962. ix, 367 pp., $2.75.

Heberden, William. *Commentaries on the History and Cure of Diseases.* 1802. New York, Hafner Publishing Company, 1962. ix, 483 pp. $3.00.

Pinel Philippe. *A Treatise on Insanity.* 1806. D. D. Davis, Trans. New York. Hafner Publishing Company, 1962. iv, 288 pp. $2.75.

Laennec, René T. H. *A Treatise on the Diseases of the Chest.* 1821. New York, Hafner Publishing Company, 1962. xli, 437 pp., 8 pl. $3.00.

Stone, Eric. *Medicine among the American Indians.* 1932. New York, Hafner, Publishing Company, 1962. xv, 139 pp., 17 illus. $2.45.

Chance, Burton. *Ophthalmology.* 1939. New York, Hafner Publishing Company, 1962. xvii, 240 pp., 6 illus. $2.45.

Lloyd, Christopher and Coulter, J. L. S. Volume IV, 1815-1900, of Keevil, J. J., *Medicine and the Navy (1200-1900).* Edinburgh and London, E. and S. Livingstone Ltd., 1963. 300 pp. $10.00.

Browne, Sir Thomas. *Religio Medici.* James Winny, Ed. Cambridge, The University Press, 1963. 154 pp. $1.75.

Saltzstein, Harry C. *Sinai Hospital and the North End Clinic.* Detroit, Michigan, Wayne State University Press, 1963. 71 pp. $1.50.

NOTES ON CONTRIBUTORS

THOMAS G. BENEDEK, M.D., is Instructor in Medicine, University of Pittsburgh School of Medicine, Pittsburgh 13, Pennsylvania.

ARTHUR L. BENTON, Ph.D., is Professor of Psychology and Neurology, State University of Iowa, Iowa City.

WILLIAM BROCKBANK, M.A., M.D. (Cantab.), F.R.C.P., is Physician at the Royal Infirmary, Manchester 13, England.

RICHARD J. DURLING, M.A., is Senior Cataloger, History of Medicine Division, National Library of Medicine, Bethesda, Maryland 20203.

ARNOLD E. S. GUSSIN, Ph.D., is United States Public Health Service Postdoctoral Fellow, Department of Biology, Yale University, New Haven, Connecticut.

MAY G. HARDY, M.A., is Bibliographer, History of Medicine Division, National Library of Medicine, Bethesda, Maryland 20203.

BARTLETT C. JONES, Ph.D., is Assistant Professor of History, Sam Houston State Teachers College, Huntsville, Texas.

ROBERT J. JOYNT, M.D., is Associate Professor of Neurology, College of Medicine, State University of Iowa, Iowa City.

ROBERT H. KARGON, is a Candidate for the Ph.D. degree, Department of History, Cornell University, Ithaca, New York.

MARTIN LEVEY, Ph.D., is Research Associate, Department of the History of Science and Medicine, Yale University School of Medicine.

GERALD P. RODNAN, M.D., is Associate Professor in Medicine and Chief of Section of Rheumatic Diseases, University of Pittsburgh School of Medicine, Pittsburgh, Pennsylvania.

KENNETH F. RUSSELL, M.B., M.S., F.R.A.C.S., is Associate Professor of Anatomy and Reader in Medical History at the University of Melbourne, Victoria, Australia.

ANDREW B. SCOTT, M.B.E., M.A. (Cantab.), is Administrator of the Board of the United Manchester Hospitals, Oxford Road, Manchester 13, England.

Index

Aaberg, Carl, 291
Abel, Rudolf, 276, 277
ʿAbbās b. Sacid, 373
abū Bakr, 374
Abū Bakr Aḥmad b. ʿAlī, 370
Abū Hātim, 373
Aḥmad ibn Yaḥyā al-Balādhuri, 374*n*
Ackerknecht, Erwin, 7
Adami, 186
Adams, G. W., 245*n*
Adams, S. H., 166, 168
Adelmann, H. B., 178-9, 295
Agassiz, Louis, 142, 143
Agnew, L. R. C., 75-7, 82, 102, 176-8, 207
Aitken, P. H., 292
Albertus de Saxonia, 183
Alcmaeon, 130*n*, 388, 389
Alden, John, 303
Aldine, 184
Aldrovandi, Ulisse, 80, 206, 396-8
Alessio, 184
Alexander, 372
Alexander *the Great*, 12
Alexander, Philip, 294
Allen, F. M., 365*n*
Allen, M. M., 353*n*
Alles, G. A., 294
al-Ma'mūn, *Caliph*, 373
Alston, Charles, 189
Amelung, W., 292
American Medical Association, 357, 358, 361, 362, 368
Anastassiades, 279
Anaximander, 388
Anaximines, 388
Anaxogoras, 132
Anderson, J. Q., 90-2
Andreoli, Aldo, 80
Andry, Nicolas, 190-1
Annan, Gertrude L., 95-7, 204
Anning, S. T., 206
Anson, B. J., 146*n*
Apuleius Platonicus, 299
Arago, 85
Arbuthnot, John, 189
Archila, Ricardo, 312
Argellata, Petrus de, 182
Argenson, René d', 237, 238*n*, 239
Argentine, John, 80
Aristotle, 46, 130-48, 184, 321, 389, 397, 399
Armstrong, C. A. S., 80
Ars moriendi, 173
Aselli, 307
Asimov, Isaac, 206
Aubert, 138, 144
Aubrey, John, 222, 339
Auerbach, Erich, 235*n*
Austin, Anne L., 196-8, 205
Auzout, Adrien, 106, 107
Avicenna, 205
Ayurveda, 199

Baas, J., 345*n*
Babb, Lawrence, 204, 226*n*
Babson, Roger, 161
Bacon, Francis, 104, 337-48
Bacon, Roger, 299
Baege, M. H., 328*n*
Bahlīndād, 372
Baker, W. E. W., 381
Balde, Jakob, 349*n*, 350
Baldwin, Louis, 198
Ballester, L. G., 316
Balzac, 239*n*
Bancroft, F. W., 328*n*, 329
Banks, *Sir* John, 15
Barber, M. A., 186, 187
Bard, Samuel, 187
Barrett, C. R. B., 9*n*
Barrough, Phillip, 291
Bartholin, Thomas, 292
Bartholomew, Carol, 185
Bast, T. H., 146*n*
Bastedo, W. A., 368*n*
Bate, George, 345
Battie, William, 205
Bauer, Victor, 29, 33
Baumann, E. D., 386
Baumgartner, Leona, 385
Beard, R. O., 198
Beare, J. I., 130*n*, 135*n*
Beatty, W. K., 94-5
Beaumont, William, 293, 314
Beccari, 174-5
Beccaria, Augusto, 289, 309
Becker, E., 228*n*
Becker, F., 352
Becquerel, 313
Beecher, H. K., 205, 311-12
Beer, E. S. de, 338*n*, 345*n*
Beers, Clifford, 151
Beijerinck, 280*n*
Beilstein, 300
Bell, John, 307
Bell, W. J., Jr., 292
Bellini, Lorenzo, 178
Belloni, Luigi, 80, 81
Belt, Elmer, 294
Benda, C., 129
Benedek, T. G., 349-52, 401
Benezit, 282*n*
Benivieni, 259
Benjamin, J. A., 180
Bennett, Joan, 101, 200-2
Bentham, Jeremy, 293
Benton, A. L., 381-4, 401
Beringer, J.B.A., 206
Bernard, Claude, 194-6
Bernardus de Gordonio, 183
Bernier, 282
Bett, Henry, 224*n*
Bevan, A. D., 361
Bhela, 199
Biaudet, D.-C., 191
Bible, *O.T.*, 284
Bick, E. M., 289
Biebow, Hans, 68, 71
Bignami-Odier, Jeanne, 224*n*

Bills of Mortality, 338, 340, 341, 346, 347
Birch, Thomas, 338*n*
Bishop, W. J., 185, 196-7
Blackmore, *Sir* Richard, 9
Blair, Walter, 91
Blake, J. A., 146*n*
Blatherwick, N. R., 365*n*
Bloch, 60, 62
Bloch, Camille, 220*n*
Blochmann, 25
Bloomfield, M. W., 224*n*
Bloomfield, N. W., 223*n*
Boas, Marie (see Hall, M. B.)
Boase, T. S. R., 293
Boccalini, Traiano, 179
Bodenheimer, F. S., 140*n*
Boerhaave, H., 174-5, 180, 188-9, 218, 257*n*, 258, 261 *et passim*
Boileau, 107
Bologa, V. L., 205
Bonitz, Hermann, 142*n*
Bonner, T. N., 205
Boot, Armand de, 345
Bordeu, 270
Borelli, 346
Bosch, Hieronymus, 224*n*
Bostocke, R., 391
Bouillier, 179
Bouman, K. H., 160
Bourgey, Louis, 137*n*
Bowditch, H. I., 179
Boyd, 186
Boye, C. J., 291
Boyer, *Dr.*, 215
Boyle, Robert, 4, 80, 103, 104, 262, 391
Bradley, *General* Omar, 153
Brahe, Tycho, 390
Brain, *Sir* Russell, 186
Brand, Jeanne L., 79, 149-57, 189-90, 207, 386
Brandeis, L. D., 321, 334
Brant, Sebastian, 224, 225, 349
Braun, Alexander, 56
Brazier, M. A., 129
Brett-James, Norman, 339*n*
Brian, Russell, 204
Brier, Royce, 161*n*
Brierly, W. B., 324*n*
Bright, Timothie, 204
Brinaise, 108
Brinton, J. H., 246, 249, 253, 254
Brockbank, E. M., 293
Brockbank, William, 293, 401
Brodman, Estelle, 81, 293
Brooks, Chandler, 99-100
Brooks, Harlow, 367*n*
Brown, Carleton, 182
Brown, Lawrason, 364*n*
Brown, Thomas, 41
Brown, W. H., 381
Browne, *Sir* Thomas, 101, 200-2, 400
Bru, Paul, 229*n*
Bryan, W. J., 166
Buddenbrock, W. von, 327, 329
Bühler, C. F., 182-3
Bullis, H. E., 151
Bullough, V. L., 287, 290, 317
Bunsen-Roscoe law, 325
Burney, Fanny, 204
Burns, Paisley M., *see* Watt, *Mrs.* Robert
Burns, Robert, 37
Burnside, Ambrose, 241 *et passim*
Burr, H. S., 315
Burrow, J. G., 316
Burton, Robert, 204
Burton, William, 188, 189
Bush, A. D., 361*n*
Butler, *Justice*, 360
Buzurj-mihr, 372

Calderwood, Janet, 36
Calonne, A. de, 228*n*
Calvin, 225
Camus, A. G., 137*n*, 141*n*
Candolle, de, 323
Capparoni, P., 309
Cardan, 184, 349*n*
Carlson, E. T., 387-8
Carlton, W. J., 204
Carnarius, Johannis, 349*n*
Carpentier, Elisabeth, 290
Carver, T. N., 171
Cassedy, J. H., 79
Castiglioni, A., 129
Cavanagh, G. S. T., 292
Caxton, W., 173*n*
Celsus, 77, 194
Ceppellini, R., 88
Chalmers, Thomas, 46
Chamberlen, Hugh, 9
Chambers, R., 49
Chanakya, 372*n*, 373
Chance, Burton, 400
Charaka, 199
Charcot, J. M., 400
Charles II, 337, 338, 339, 341
Chatelain, A., 285*n*
Chaucer, Geoffrey, 285
Cheape, John, 37
Chekhov, 186
Chennell, John, 40
Cherniss, Harold, 132*n*
Choulant, 307
Chevreul, M. E., 297-8
Church, 247
Cicero, 46, 183
Claes, 290
Clair, Colin, 291
Clap, Thomas, 303
Clarck, Timothy, 103
Clark, G. N., 347*n*
Clark-Kennedy, 101
Clarke, Edwin, 90, 93-4, 130-48, 193-4, 203-4, 207, 306-7, 312, 313, 314, 315, 394, 396, 399
Clavel, J.-P., 191
Clay, R. M., 221*n*
Clay, R. S., 381
Cleghorn, Robert, 41
Cleopatra, 372
Clerk, Roger, 285
Coates, J. B., Jr., 206, 310-11, 316

Coats, Thomas, 48
Cock, 179
Cockburn, A. J., 99
C[ohen], D. J., 173
Cohen, I. B., 260
Cohnheim, 186
Coiter, Volcher, 397
Colbert, 104, 232, 233*n*
Cole, C. W., 233*n*
Coleman, William, 51-63, 102
Coleridge, 200
College of Physicians, London, 8
Colles, 43
Colombier, Jean, 220
Combe, Jacques, 224*n*
Conolly, John, 98
Constable, 47
Cook, *Sir* Edward, 196
Cooper, *Sir* Astley, 176-8
Cooper, Bransby, 176, 178
Cooper, D. B., 180
Copernicus, 390
Cordasco, F., 42, 48, 49
Cornford, F. M., 130*n*, 134*n*
Corsini, Andrea, 81
Corvisart, J. N., 400
Costa, A. B., 297-8
Costantino, l'Africano, 308-10
Coulson, 198
Coulter, J. L. S., 400
Councilman, 186
Courrier, Robert, 106
Court, T. H., 381
Courtney, J. M., 81
Cowen, D. L., 80
Coyecque, E., 221*n*
Craig, R. O., 246
Crawford, *Sir* Thomas, 287-9
Creighton, 43
Creutz, R. W., 309
Crombie, A. C., 295
Crudge, Brenda, 81
Crummer, LeRoy, 2
Cuff, John, 379
Cullen, William, 99
Culpeper, Edmund, 379
Culpeper, Nicholas, 384, 385
Curie, P. & M., 313
Curtis, D. R., 99
Curtis, M. H., 286*n*
Curtius, Mattheus, 79
Cushing, Harvey, 2, 3, 4, 102, 175, 294, 300-1, 313
Cust, Lionel, 173*n*
Cutler, *Baron*, 15
Cuvier, Georges, 51-63

Dale, *Sir* H. H., 184
D'Alembert, 323
Dalin, Olof, 382, 384
Dallowe, Timothy, 188
Damiani, Antonio, 290
Dana, C. L., 163*n*, 168*n*
D'Ancona, Umberto, 295
Dandy, 313
Daremberg, Ch., 308
Darwin, Charles, 22, 175-6, 299, 322
Davenport, W. H., 101, 184-6
David, Gerard, 291
Da Vinci, *see* Leonardo
Davis Lecture, 179
Davison, W. C., 7
Debus, A. G., 390-2
Defoe, Daniel, 286
De Frede, Carlo, 290
Deichgräber, 388
Dekker, 230
Delafield, 186
Delgado, J. M. R., 194-6
Deming, C. L., 198-9
Demosthenes, 215
Dempster, W. T., 146
Denifle, H., 285*n*
Dennie, C. C., 203
Denton, G. B., 294
De Pisinis, Ladislao, 290
De Renzi, S., 308
Descartes, 104, 234, 265
Desmoulins, 143
Deutsch, Albert, 149-57
Deutsch Memorial Foundation, 181
De Voto, Bernard, 91
Dewees, W. P., 187
Dewhurst, 186
Dewing, S. B., 101, 313
Dible, J. H., 185
Dick, O. L., 339*n*
Dickenson, 186
Diderot, 221, 323
Diepgen, P., 129
Diogenes Laertius, 389
Dioscorides, 372
Disney, A. N., 381
Dix, Dorothea L., 151*n*
Doby, Tibor, 316
Doe, Janet, 76*n*
Döllinger, Ignatius, 52
Donati, Lamberto, 290
Dorchester, *Marquis of*, 10*n*
Douglass, E. L., 361*n*, 368*n*
Drabkin, D. L., 90
Drake, Daniel, 91
Du Bois-Reymond, Emil, 126, 127, 128
Dubos, R. J., 101, 273*n*
Düring, Ingemar, 137*n*
Duke, W. W., 359*n*
Duffy, John, 190
Dumaitre, Paule, 80, 306-7
Duncan, A., 49
Dunstan, 234
Dupuytren, *Dr.*, 219
Durham, F. M., 172*n*
Durling, R. J., 385-6, 401
Duvernoy, G.-L., 56, 58

Eagan, J. T., 364*n*
Ecclesiastes, 283
Edelstein, Ludwig, 136*n*, 388
Edmonds, S. E. E., 256*n*
Edwards, 199
Eimer, 25
Einstein, Albert, 85, 294, 334
Eir, 292
Eisenbach, A., 64*n*

Ellis, F. H., 8-19, 102
Elton, Charles, 275
Emerson, Haven, 172*n*, 362*n*, 366*n*
Empedocles, 77
Engelmann, 128, 129
Ent, *Sir* George, 345
Epstein, 204
Erasistratus, 399
Erasmus, Desiderius, 349, 352
Erdmann, Bertha, 198
Eriksson, Ruben, 79
Erlanger, Joseph, 293
Espinos y Capo, Antonio, 194
Étienne, 184
Evans, H. M., 2
Evelyn, John, 200
Evers, A., 292
Ewan, Joseph, 188-9, 316
Ewan, Nesta, 316
Ewing, James, 46

Fabricius *of Hilden*, 192
Fåhraeus, Robin, 291
Falconet, 107, 108
Fantus, Bernard, 354*n*, 363
Farber, Eduard, 84-5
Fatout, Paul, 247*n*
Federzini, Luigi, 80
Fenger, Christian, 184
Fenwick, 198
Fick, 129, 331
Fihrist, 373*n*
Finlayson, J., 36, 46, 48, 49
Finney, G. L., 292
Fischart, Johann, 349*n*, 350
Fischer, Alfons, 221*n*
Fish, Simon, 229
Fishbein, Morris, 171*n*, 294
Fisher, Clarence, 367*n*
Fisher, Irving, 166
Fisk, E. L., 163*n*
Fleck, G. M., 84-5, 297-8
Fleissner, Georg, 349*n*
Fleming, Donald, 399
Flerreira, A. do Amaral, 206
Flexner, Simon, 186, 331*n*, 332
Flourens, 125
Flügel, G., 373*n*
Follis, R. H., Jr., 99-100
Fontanier, Jean, 239
Forbes, T. R., 319
Ford, Charlotte, 205, 311-12
Fougeroux de Bonderoy, 88, 89
Fourcroy, 101, 297-8
Fracastoro, Jeronimo, 206, 385-6
Fraenger, Wilhelm, 224*n*
Fraenkel, G. S., 322*n*, 327, 328
Francis, W. W., 209-19, 317
Franck, Sebastian, 225, 226*n*
Franco, Pierre, 192
Frank, Shlome, 64
Franklin, *General*, 249
Franklin, Benjamin, 84, 292
Frantzius, A. von, 138*n*, 144*n*
Fredbärj, Telemak, 291
Freud Collection, 5
Frey, Manfred, 206, 395-6
Freyer, 199
Friedreich, J. B., 284
Fritsch, Gustav, 125-9
Fröhlich, H., 133*n*
Frosch, 280
Fry, [C. C.] Collection, 74, 173, 282, 378
Fuchs, 184
Fuller, Francis, 98
Fulton, John, 1, 2, 4, 11, 125*n*, 185, 291, 294, 319, 385

Gaffky, 281
Galen, 132*n*, 184, 194, 261, 299, 371, 389, 391, 397, 399
Galileo, 391
Gannett, Lewis, 151
Garbo, Dinus de, 182
Garbo, Thomas de, 182
García, *Don* Carlos, 194
Garosi, Alcide, 316
Garrison, F. H., 129
Garth, Samuel, 8-19
Garzoni, Tomaso, 227
Gaskell, *Mrs.*, 47
Gauja, *Madame* Pierre, 106
Gayant, *Mr.*, 105, 106, 108, 111, 112
Gayen, Louis, 105, 106, 107
Gay-Lussac, 85
Geoffroy, Jules, 137*n*, 141*n*
George IV, *King*, 46
Gerarde, 384, 385
Gesner, Conrad, 184, 192
Gesner, J. A. P., 381, 382, 383, 384
Getz, Bernhard, 291
Ghigi, Alessandro, 397
Ghiselin, J. T., 256
Giacosa, P., 309
Gibbs, 188
Gibson, Thomas, 36-50, 102, 295
Gilbert, J. B., 95-7
Gilbert, J. L., 99-100
Gillispie, C. C., 322
Gisi, Julia, 147*n*
Giunta, 184
Glisson, Francis, 345
Goddard, H. H., 162, 163*n*
Goddard, Jonathan, 345
Goethe, 188
Goldberg, Maria, 65
Goldberg, Martha, 228*n*
Goldfuss, 55*n*
Goldie, Sue, 196-7
Goldstein-Pollack, Ethel, 65
Goltz, 331
Goodall, A. L., 36-50, 102, 295
Gordon, C. A., 299-300
Gorlin, Morris, 305-6
Gotfredsen, Edvard, 179-80
Grand-Carteret, J., 282*n*
Granell, Manuel, 194
Grant, *General*, 241
Graunt, John, 337-48
Graves, Robert, 222*n*
Gray, James, 197-8
Greene, N. M., 312
Greenfield, Myrtle, 101, 189-90

Greenwood, Major, 338*n*
Gregorio XIII, 80
Grimarest, 282
Grmek, M. D., 85-7
Grote, George, 47
Grünewald, 224
Grundfest, Harry, 125-9, 207
Grundmann, Herbert, 223*n*
Gruner, C. G., 94
Guaita, Georg von, 20*n*, 28, 29, 32, 33
Guerlac, Henry, 337*n*
Guerra, Francisco, 83-4, 101, 184, 312, 392-3, 394
Guggenbühl, Dietegen, 315
Guild, Lafayette, 241, 250
Guillemin, Roger, 103-24, 207
Gunn, D. L., 322*n*, 327, 328
Gurye de Montpoly, Jasper de, 105
Gussin, A. E. S., 321-36, 401
Guthrie, W. K. C., 101, 388-9
Guttmacher, Manfred, 99
Guy, Henry, 15
Guyénot, 188

Haddon, Jacob, 189
Hahn, André, 80, 102, 306-7
Hahnemann, 307
Hall, A. R., 296, 297
Hall, David, 303-4
Hall, D. P., 100, 314
Hall, M. B., 296-7
Halleck, *General*, 243
Haller, Graf, 129
Haller, Albrecht von, 218, 315, 395, 396
Haltia, Matti, 291
Hamey, 14
Hammond, W. A., 242, 254, 304
Hampton, Isabel, 197
Hannay, David, 99
Hantz, H. D., 148*n*
Hardy, May, 385-6, 401
Hare, H. A., 163, 164*n*, 358*n*, 367*n*
Harper, R. M. J., 205
Harvey, William, 2, 8, 11, 14, 185, 266, 284, 291, 390, 399
Haslam, John, 98
Hathaway, Francis, 354*n*
Hauffen, A., 352
Haupt, Paul, 284
Havens, W. P., Jr., 310-11
Haymaker, 313
Heard, J. T., 248
Heaton, C. E., 187-8
Heaton, L. D., 310-11
Heberden, William, 400
Hektoen, 186
Hellerström, Sven, 291
Hellinga, W. G., 290
Helman, *Dr.*, 64
Helmholtz, 331
Henry VIII, 10, 13
Henschel, August, 308
Henschen, Folke, 291
Heraclitus, 389
Herndon, Thomas, 392-3
Herodotus, 292
Herr, Friedrich, 223*n*
Herrick, C. J., 126, 141*n*
Herrick, C. L., 126, 141*n*
Herschel, John, 299
Hershkovitch, Bendet, 73*n*
Hertwig, Oscar, 23
Hertzler, Arthur, 185
Heseler, Baldasar, 79
Heydenreich, 87
Heymann, 21
Hill, C. F., 381
Hind, A. M., 173*n*
Hindle, Brooke, 83-4
Hintzche, Erich, 315
Hippocrates, 77-8, 97-8, 132, 139, 184, 194, 389, 394
Hirsch, Rudolf, 292
His, Antonia, 395
His, Wilhelm, 395
History of Science Society of Japan, 205, 315
Hitzig, Eduard, 125, 126, 127
Hobson, R. P., 165
Hodge, 187
Hoff, H. E., 103-24
Hoffmann, F., 257*n* *et passim*, 284
Holbach, 323, 330
Holbrook, Stewart, 186
Holmes, A. F., 215*n*
Holmes, O. W., 185, 187
Holmes, S. J., 158*n*, 162
Holmes, U. T., 79
Holst, P. F., 292
Hooke, Robert, 297, 299
Hoorn, Johan von, 291
Hôtel-Dieu, 221*n*
Howard, D. H., 272-81, 317
Howell, James, 287*n*
Huard, Pierre, 85-7
Hudson, A. P., 91
Hudson, H. H., 352
Hughes, 179
Huizinga, Johan, 223*n*
Humboldt, Alexander von, 57
Humphrey, O. D., 143*n*, 146
Hunt, Holman, 47
Hunt, R. A., 294
Hunt, Rachel M. M. (*Mrs.* R. A.), 294
Hunt, Thomas, 47
Hunter, John, 185, 217
Hunter, Richard, 205, 206, 387-8
Hunter, William, 46, 292, 293
Huntley, F. L., 200-2
Huss, Arvid, 291
Huss, Magnus, 291
Huygens, Christian, 345, 346, 347, 348
Huygens, Lodewijk, 347
Hyrtl, 283, 284

Ibn al-Wahshīya, 370-77
Ingersoll, Ralph, 152
'Isā b. Sāsa, 373, 374
Ishak Ibu Amran, 309
Isokrates, 349
Ivy, R. H., 102, 314
Izquierdo, J. J., 194-6
Iwanowsky, 280*n*

Jābir, 377
Jābir b. Ḥayyān al-Ṣūfī, 373
Jackson, C. T., 307
Jackson, J. H., 125, 129
Jacobs, H. B., 2
Jahn, M. E., 206
Jakobsen, Jakob, 291
James VI, 44
Jameson, Edwin, 400
Jarcho, Saul, 179, 184-6, 289
Jardine, George, 46
Jasni, A. W., 64*n*
Jenner, Edward, 185, 307
Jennings, H. S., 171, 326, 328, 334
Jevons, F. R., 174-5, 207
Joachim *of Flora*, 224*n*
Johnson, E. A. J., 230*n*
Johnson, R. H., 172*n*
Johnson, Samuel, 188, 204
Jones, B. C., 158-72, 207, 353-69, 401
Jones, G. W., 241-56, 317
Jordan, Phillip, 190
Josephus, 384, 385
Joslin, E. P., 365*n*
Jouanny, R., 282*n*
Jowett, Benjamin, 196
Joynt, R. J., 381-4, 401

Kammunah, Ibn, 290
Kaplan, Louis, 204
Kaplovski, 65
Kargon, R. H., 337-48, 401
Karsch, A., 135*n*, 148
Kastner, *Mrs.* Rose, 150
Kautilya, 372*n*
Keele, K. D., 85-7
Keevil, J. J., 400
Keibel, Franz, 146*n*
Kellogg, W. F., 329
Kelly, H. A., 362*n*
Kepler, 390
Ker, John, 49
Kerker, 188
Kershaw, J. B., 251*n*
Keynes, *Sir* Geoffrey, 204, 299
Keys, T. E., 203
Khâlid the Barmacide, 373
Kibre, Pearl, 290
Kielmeyer, 57
King, L. S., 77-8, 102, 206, 257-71, 301-2, 317, 319
Kirk, G. S., 130*n*
Kirkland, Sergeant, 251
Kisch, Bruno, 393-4
Kitchin, G. W., 342*n*
Klausenberg, Fabian, 67
Klebs, A. C., 294
Kling, Carl, 291
Koch, Charlotte, 228*n*
Koch, Robert, 186, 187, 273
Kock, Wolfram, 205, 291
Kolle, Kurt, 205, 313
Konold, D. E., 312
Kowarzik, Joseph, 20*n*
Kranspa, 126
Kress, D. H., 158, [illegible]
Kristeller, P. O., 309
Kronick, D. A., 94-5
Krueger, H. C., 205
Krumbhaar, E. B., 400
Kuhn, 327
Kutumbiah, P., 199-200

Labaree, Leonard, 292
Lachèvre, Frederic, 239*n*
Laennec, R. T. H., 179, 400
Laín Entralgo, Pedro, 316
Lallemand, Leon, 231*n*
Lamarck, 143, 176
Lambert, R. J., 293
Lambert, S. W., 359, 361
Landsteiner, Karl, 316
Langland, William, 15, 221
Larrey, D.-J., *Baron*, 185, 250*n*, 291
Lauridsen, Laurits, 291
Lavoisier, Antoine, 88, 188, 297, 298, 299
Leake, C. D., 81, 129
Leclerc, L., 374*n*
Leclercq, F. S., 365*n*
Le Count, 186
Lee, Robert E., 241, 244, 245, 256
Lee, R. I., 368*n*
Leeu, Gheraert, 290
Le Fanu, William, 209*n*
Lehrs, Max, 173*n*
Leibowitz, J. O., 97, 283-4, 317
Leibniz, 195
Leigh, Denis, 98-9
Lenz, H. O., 142*n*
Leonard, E. M., 231*n*
Leonardo da Vinci, 85-7, 399
Lesky, Erna, 81, 307-8
Letherland, Joseph, 189
Letterman, Jonathan, 242 *et passim*
Leuckart, 21
Levey, H. A., 99-100
Levey, Martin, 97-8, 100, 199-200, 305-6, 370-77, 401
Lewes, 137, 140, 148
Lewis, C. S., 286*n*
Lewis, H. C., 90-2
Leyden, Lucas van, 378
Libert, Lucien, 238*n*
Liénard, 282
Liese, Wilhelm, 228*n*
Lignamine, J. P. de, 299
Lind, L. R., 206, 396-8
Lindeboom, G. A., 188-9
Lindsay, George, 379-81
Linnaeus, 188, 189
Lister, 307
Littré, E., 130*n*
Litvin, 65
Lizars, 219
Lloyd, Christopher, 400
Lobb, Theophilus, 189
Locard, Edmond, 239*n*
Locke, John, 265, 297
Loeb, Jacques, 321-36
Loeb, L. B., 332*n*, 335
Loeffler, Friedrich, 272-81
Loeffler, G. F. F., 272
Logan, William, 210*n*
Logan, *Mr.*, 38

Loir, 274, 275
Lones, T. E., 130*n*, 136, 138, 145
Long, E. R., 186-7
Long, M. L., 365*n*
Lopez Pinero, J. M., 316
Louis XIII, 236
Louis XIV, 235, 236, 282
Lowe, Peter, 46
Lower, Richard, 103, 104, 106
Lucian, 349
Luria, S. E., 280*n*
Lurie, Edward, 52*n*, 53, 58
Luttrell, Narcissus, 10*n*
Lydgate, John, 182
Lyell, *Sir* Charles, 176
Lyman, R. S., 315
Lyon, *Dr.*, 48

Macalpine, Ida, 205, 206, 387-8
Maccabaean Prize, 386
MacCallum, W. G., 186
McClellan, *General*, 242, 244
McConnell, P. A., 246
Macfarlane, Duncan, 38
Mackenzie, P., 48, 49
MacKinney, L. C., 179
McLeod, George, 41
McLeod, James, 41
McMillin, 247*n*
McNaghten, 99
McReynolds, *Justice*, 360
Macro, Cox, 189
Madden, Daniel, 80
Madden, *Sir* Frederick, 47
Magendie, 395
Magoun, H. W., 80
Maimonides, 305-6, 377
Maitland, William, 339*n*
Major, R. H., 186-7
Malagola, Carlo, 285*n*
Malato, M. T., 309
Mall, F. P., 332
Malpighi, Marcello, 178-9, 399
Manardo, Giovanni, 82
Mancini, Domenico, 79
Mandel, Sima, 65
Manka (Manikya), 373
Manton, S. M., 144*n*
Marin, F. R., 393
Marsigli, 60, 62
Martí-Ibáñez, Félix, 101, 193-4
Martin, Germain, 231*n*
Martineau, Harriet, 197
Martinez Duran, Carlos, 206
Martini, U. de, 309
Martius, K. F. P. von, 51 *et passim*
Mason, T., 49
Mast, S. O., 326, 328, 329, 334
Matas, Rudolph, 91, 190
Maternus, Firmicus, 183
Matthiessen, Hugo, 291
Maugham, Somerset, 185
Maurice, *Sir* Frederick, 288
Mauvillain, 282
Maxim, Hudson, 159
Maxwell, H. E., 279*n*
Maxwell, L. C., 365*n*
Maxwell, W. Q., 245*n*
May, Margaret T., 396-8
Mayer, C., 279*n*
Mayerne, Turquet de, 192
Mayow, John, 345
Mazzeo, J. A., 292
Mead, Richard, 189, 284
Meidinger, 60, 62
Meier, Michael, 224*n*
Meigs, 187
Meine, F. J., 91
Melanchthon, 390
Mencken, H. L., 168
Menetrier, 139
Mercier, Sebastian, 221
Mercuriale, Girolamo, 381
Merton, Robert, 344*n*
Mestler, G. E., 95
Mettler, Cecelia C., 129, 345*n*
Meunier, 381, 384
Meyer, Adolf, 313
Meyer, K. F., 189-90, 203
Meyerhof, Max, 374*n*
Michaelis, J. H., 283-4
Miescher-His, Friedrich, 206, 395-6
Miles, A. A., 273*n*
Millard, William, 176-8
Miller, Genevieve, 1-7, 102
Miller, Henry, 187
Miller, J. L., 364*n*
Millington, Thomas, 9, 12
Milton, 292
Mitchell, S. Weir, 5
Mithridates Eupator, 371
Möller, Werner, 291
Møller-Christensen, Vilhelm, 291
Mönkemöller, 226*n*
Molière, 234, 235, 238, 282
Monardes, N. B., 392-3
Monboddo, *Lord*, 204
Monro, John, 205
Montague, Charles, 10
Montaigne, 226, 234
Moorat, S. A. J., 102, 182-3, 184
Moore, Norman, 345*n*
Moore, W. G., 234*n*
Mora, George, 98-9, 308-10
Moray, *Sir* Robert, 338, 343 *et passim*
More, Thomas, 221, 234
Morel-Retz, L. P. G. B., 282
Morgagni, 258
Morgan, John, 84, 314
Morgenstern, Leon, 294
M[orris], A. H., 282
Morris, *Sir* Henry, 198
Morson, Clifford, 198-9
Mortimer, Cromwell, 189
Morton, 307
Moshe ben Maiman, 97-8
Motherwell, William, 44
Müller, A., 373*n*
Müller, Johannes, 80, 127, 395
Müri, Walter, 194
Muir, James, 39, 40
Munk, William, 8*n*, 10*n*
Munson, Burnaby, 92-3
Munson, J. P., 145

Muntner, Suessmann, 97-8
Murri, Augusto, 80

al-Nadīm, 373
Nahum, L. H., 310-11
Nathan, D., 363*n*
Needham, J., 345
Neimark, 65
Nemoy, Leon, 289, 290
Nernst, 85
Newton, *Sir* Isaac, 262, 296-7, 337
Nicandros, 371
Nicholls, George, 230*n*
Nicia, Gabriele, 290
Nightingale, Florence, 196-7
Nixon, 179
Noland, L. E., 395-6
Nordmann, 395
Noshirowān *the Just*, 372
Nusbaum, 65
Nutting, Adelaide, 197

O'Connor, Cecilia M., 87-8
Östberg, Karin, 292
O'Faolain, Sean, 3
Ogle, 141, 142, 143
Oken, Lorenz, 53, 57
Oldenburg, 104
O'Leary, Charles, 246
Oliver, Eugène, 191-3
Olmedilla y Puig, J., 393
Olshanetzki, Esther, 65
O'Malley, C. D., 80, 190-3, 300-1
O'Neill, J. E., 287-9, 317
Oosterbaan, D. P., 228*n*
Ophüls, 186
Opie, 186
Oribasius, 371
Osborn, J. M., 11
Osborne, O. T., 354*n*, 366, 368*n*
Osler, *Sir* William, 175-6, 185
Osmania Medical College, 315
Osterhout, W. J. V., 324*n*, 330, 331*n*

Pacioli, Luca, 299
Pagel, Walter, 130*n*, 205
Paget, *Sir* James, 196
Paget, Stephen, 185
Palla, Akos, 206, 394
Palmerston, *Lord*, 47
Pampoukis, *Dr.*, 276, 277
Paracelsus, 184, 205, 259
Paré, Ambroise, 75-7, 185
Partington, 85
Parvin, 187
Pascal, 233, 234
Pasteur, L., 273*n*, 274 *et passim*
Pasti, 188
Pathi, A. L., 97
Patin, Gui, 107, 108
Paultre, Christian, 232*n*
Pausanias, 142
Pavlov, 334
Pazzini, A., 309
Pearl, Raymond, 163, 168, 169, 171, 328
Pearson, Drew, 153
Peck, A. L., 137*n*
Peel, *Mr.*, 176
Percy, 222*n*
Pericles, 132
Perley, *Col.* T. F., 247*n*, 254, 255, 256
Perrault, Claude, 106, 107, 147*n*
Peset, Vicente, 394-5
Peter *of Blois*, 79
Petersson, R. T., 200-2
Petrunkevitch, Alexander, 20-35, 102
Petrus de Abano, 183
Petty, William, 338*n*, 339, 346, 347
Peuckert, W. E., 223*n*
Pevsner, Nikolaus, 224*n*
Peyton, W. T., 139*n*
Phalaris, 183
Phillips, W. C., 361*n*
Philumenos, 371
Pickett, Deets, 161*n*
Pierrepoint, *Lady* Grace, 10, 15
Pilcher, L. S., 2
Pinel, Philippe, 239, 400
Pirckheimer, Wilibald, 349*n*
Pitcairn, Archibald, 260
Pittendrigh, C. S., 324*n*
Platearius, Johannes, 183
Plater, Felix, 396
Plato, 130*n*, 133, 134, 389
Platt, 187
Plivolski, Regina, 65
Plutarch, 132
Poggendorff, J. C., 129
Polanus, Johan, 189
Pommery, *Mme.*, 274
Pompeius, 371
Pope, *General*, 244
Popenoe, Paul, 172*n*
Poppel, M. H., 313
Portal, A., 136
Poschenrieder, Franz, 133
Powell, Louise, 198
Poynter, F. N. L., 101, 130*n*, 182, 184, 205, 386
Premuda, Loris, 293
Prichard, J. C., 98
Priestley, Joseph, 299
Prior, Matthew, 10
Proskauer, Curt, 393-4
Puschmann, T., 371*n*
Pythagoras, 77, 388

Querido, Lotte, 290
Quillet, Claude, 191
Quinby, Jane, 294
Qusṭā b. Lūqa, 373, 374

Raach, J. H., 93-4
Racine, 235
Radcliffe, John, 9
Radhakrishnan, S., 199-200
Raeburn, Henry, 48
Rameau, 221
Ramón, P., 147*n*
Ramón y Cajal, Santiago, 195
Randall, J. H., 134*n*
Rankin, J. E., 153
Rappaport, Rhoda, 88-9
Ratdolt, 183

Raven, J. E., 130*n*
Ray, Isaac, 99
Ray, P., 372*n*
Raynaldo, Odorio, 115*n*
Raynaud, M., 282*n*
Reddy, D. V. S., 294, 315
Reed, R. R., 226*n*
Rees, Goronwy, 185
Reeves, Marjorie, 224*n*
Regemorter, Assuerus, 345
Regimen sanitatis, 184
Reichert, 127, 128
Reichert, C. K., 142*n*
Reicke, Siegfried, 228*n*
Reid, David, 293
Reinach, T., 371*n*
Reingold, Nathan, 336
Reinhard, C. T. E., 284
Remners, O. T., 353
Reuchlin, Johann, 183
Reynolds, *Sir* Joshua, 48
Reynolds, Lawrence, 1, 5, 6
Rhazes, 309
Rhodes, D. E., 79
Rice, H. C., 81
Rice, T. B., 161, 163
Richardson, 187
Richmond, *Dr.*, 48
Ricketts, H. T., 186
Riley, H. T., 286*n*
Ringelblum, Emanuel, 69
Ripley, George, 390
Rittenhouse, David, 84
Robartes, John, 343
Robbins, R. H., 182
Roberts, Charles, 289*n*
Robertson, Alexander, 346*n*
Robertson, T. B., 330, 331*n*
Robertson, William, 210*n*
Robinson, Victor, 152
Rodnan, G. P., 349-52, 401
Roentgen, 313
Rogers, F. B., 314
Rogg, Gottfried, 349-52
Rokitansky, 184
Romer, A. S., 141*n*, 146
Rommel, Peter, 381, 382, 384
Ronsard, Pierre, 224
Rooseboom, Maria, 188, 386
Roper, Abel, 10
Roquetaillade, Jean de, 224*n*
Rosen, Deborah, 65
Rosen, George, 3, 152, 307-8, 317, 386
Ross, E. A., 170
Roth, Charles, 191
Roueché, Berton, 186
Roussel, A. E., 354*n*
Roux, Philbert, 209-19
Rowbottom, M. E., 80
Rowntree, Seebohm, 288
Royal Society, 337-48
Royal Society of Medicine, 316
Rubner, 129
Rufus *of Ephesus*, 309
Ruggi, Giuseppe, 80
Ruiz Moreno, Anibal, 206
Rumkowski, Josef, 64, 65, 66
Rumkowski, M. C., 64
Rush, Benjamin, 5, 400
Ruskin, John, 47
Russel, J., 292
Russell, E. S., 328, 329
Russell, K. F., 381, 401

Sabinus, 389
Sachs, Julius, 331
Sacrobosco, 183
Sainte-Martha, Scévole de, 191
Saint-Hilaire, Barthélemy, 138*n*
St. Peter's Hospital, 198-9
Saint-Simon, 235
Saleeby, C. W., 160, 161*n*, 165, 166*n*
Salter, F. R., 230*n*
Saltzstein, H. C., 400
Samion-Contet, Janine, 80, 306-7
Santayana, 152
Sapegno, Natalino, 223*n*
Sarton, George, 1, 101
Saunders, J. B. de C. M., 81
Saunders, J. T., 144*n*
Saunders, Richard, 84
Sauvages, 270
Sbaraglia, G. G., 178
Scarlett, Edward, 379
Scheler, L., 88-9
Schelling, 57
Schmidt, Albrecht, 350*n*
Schmidt, Johann, 381, 384
Schneck, J. M., 176, 207
Schneider, D. M., 149*n*, 152
Schneider, J. G., 144*n*
Schreiber, Julius, 181
Schreiber, W. L., 173*n*
Schütz, 273
Schullian, Dorothy M., 75-82, 174-81, 283-95, 379-86
Schulze, Franz, 21
Schuman, Henry, 1-7, 82
Schuman, *Mrs.* Henry, 4
Schuman Memorial Lecture, 180
Schweitzer, Albert, 81
Scott, A. B., 401
Scott, Walter, 47
Scudamore, 179
Seabury, Samuel, 303-4
Secher, Ole, 291
Semelaigne, René, 220*n*
Serapion, 97, 183
Sérieux, Paul, 238*n*
Sevilla, P. F., 316
Seymour, E. L. D., 274*n*
Shakespeare, 204
Shamasastry, R., 372*n*
Shânâq, 373, 377
Sheldrake, T., 39, 49
Sherard, William, 189
Sheridan, 256
Sherrington, *Sir* Charles, 389
Shippen, William, 187
Shryock, R. H., 154
Sierakowiak, David, 68*n*
Sigerist, H. E., 1, 154
Siggel, A., 377
Simon, Norman, 289

Simpson, G. C., 324*n*
Sinclair, Andrew, 357*n*
Sinclair, H. M., 180
Singer, Charles, 1, 132*n*, 206, 301-2
Sizer, Theodore, 291
Sloane, Hans, 189
Smeaton, W. A., 88-9, 101, 297-8
Smith, G. W., 101, 304-5
Smith, Homer, 100
Smith, John, 284
Smythe, R. H., 205
Snorrason, Egill, 291
Solimene, Antonio, 290
Sollmann, Torald, 366*n*
Sondevall, 141
Sonnedecker, Glenn, 304-5
Sonnenburg, Ludwig, 137*n*, 138
Souques, A., 130*n*
Soury, Jules, 138
Spector, Benjamin, 293
Spencer, Herbert, 23
Sprat, Thomas, 337*n*, 338*n*, 344, 346*n*
Sprengel, Kurt, 138
Spix, J. B. von, 51, 52, 58, 59, 61
Stackpole, E. J., 245*n*
Stadelmann, Rudolph, 223*n*
Stafford, Jean, 185
Stahl, 259, 260, 270
Stannard, Jerry, 87-8, 130-48, 207, 388-9
Stanton, E. M., 243
Stanton, Madeline E., 301
Starling, E. H., 168
Stecher, R. M., 5
Steffen, Lincoln, 155
Steffensen, Jón, 291
Steinschneider, M., 377
Steno, 180
Stephenson, John, 209-19
Steudel, Johannes, 80, 292
Stevenson, Allan, 294
Stevenson, L. G., 209, 317, 319
Stewart, Isabel M., 205
Stifft, J. A. von, 308
Stillé, C. J., 248*n*, 254
Stillman, E. G., 363*n*
Stockard, C. R., 164 *et passim*
Stoddard, Cora F., 171*n*, 357*n*
Störck, Anton von, 308
Stone, Eric, 400
Stone, *Justice*, 360
Stookey, Byron, 100
Stop, 282
Storer, 187
Stout, C. T., 356, 362
Stowe, H. B., 303
Strabo, 142*n*
Strack, Fr., 137*n*
Strauss, B., 373*n*
Stuart, Alexander, 261, 262*n*
Stubbs, George 299
Süssmilch, Johann, 340*n*
Susemihl, F., 137*n*
Susruta, 199
Sutherland, *Justice*, 360
Swammerdam, 189
Swedenborg, 291
Swieten, Gerard van, 308
Sydenham, Thomas, 9
Sydenham, William, 9
Szykier, Leon, 64, 65, 66, 67

Tabanelli, Mario, 315
Tardif, René, 238*n*
Tauler, Johannes, 226*n*
Taylor, Rupert, 224*n*
Temkin, Owsei, 152
Tennyson, Alfred, 47
Tenon, 233
Thales, 388
Theophrastus, 372, 384, 385
Thieme, W., 352
Thieme-Becker, 282*n*
Thomas, J. H., 222*n*
Thompson, C. J. S., 3
Thompson, *Sir* D'Arcy, 136, 141, 144
Thoms, Herbert, 187-8, 303-4
Thomson, Elizabeth H., 294
Thomson, *Sir* George, 92-3
Thomson, *Sir* J. J., 92
Thomson, Thomas, 44
Thornton, J. L., 101, 299-300
Thorpe, W. H., 336
Thudichum, J. L. W., 90
Tiffany, L. H., 324*n*
Timiriazev, 23
Tinbergen, N., 335*n*
Todd, Armstrong, 198
Todd, R. B., 143*n*
Tom o'Bedlam, 222
Topley, 273*n*
Tortona, C. A., 379
Tournes, 184
Towne, C. H., 363*n*
Transeau, Emma L., 159, 166, 167
Trent, J. C., 2, 5, 6
Tuetey, Alexandre, 220*n*
Tuke, D. H., 222*n*
Tuke, William, 99, 234, 239
Tully, R. I. J., 101, 299-300
Turbière, 108
Tushnet, Leonard, 64-73, 102
Tyson, Edward, 9

Uhlenhuth, 280
Underwood, E. A., 206, 301-2
U. S. Sanitary Commission, 242, 248, 254
Ustvedt, H. J., 292

Vaillant, 189
Valenciennes, Achille, 51
Valles, 394-5
Vallisneri, Antonio, 295
Van Helmont, 259, 346
Vapereau, Gustav, 282*n*
Vasconcellos, Ivolina de, 205
Vauquelin, N. L., 298
Vautrollier, Thomas, 291
Vecki, V. G., 363*n*
Verdoorn, Frans, 386
Vesalius, Andreas, 3, 4, 79, 102, 189, 291, 300-1, 390
Vié, Jacques, 237*n*
Viets, H. R., 175
Vieussens, Raymond, 284

Virchow, 126, 128, 186
Vives, 229
Vollmer, H., 352
Volprecht, Alfred, 137*n*
Volstead, A. J., 355
Volstead Act, 358, 359
Voltaire, 323, 330

Wald, Lilian, 197
Waldeyer, 126, 128, 129
Walerstein, Ida, *see* Schuman, *Mrs.* Henry
Walker, A. E., 129
Walker, *Sir* Thompson, 199
Wallace, G. B., 354*n*
Waller, Erik, 76*n*
Wallis, John, 104, 347
Wasteneys, Hardolph, 325*n*
Waterhouse, Benjamin, 5
Watt, John, 30, 47
Watt, Mary, 47, 48
Watt, Robert, 36-50, 295
Watt, *Mrs.* Robert, 41, 47
Wechel, 301
Wedderburn, *Sir* John, 189
Weedon, F. R., 79
Weil, U. H., 190-1
Weinberger, B. W., 378*n*
Weismann, August, 20-35
Weiss, H. B., 101
Weiss, Paul, 295
Welch, W. H., 186, 187
Wellcome, *Sir* Henry, 184
Wellman, 388
Wells, H. G., 186
Wells, *Sir* T. S., 199
Wells, Warner, 90-2
Westergaard, Harald, 341*n*
Wheeler, W. B., 353, 356
Whipple, A. O., 315, 396
Whistler, Daniel, 338, 344, 345
White, P. D., 366
Whitelaw, Alexander, 44, 48
Whitelaw, Ralph, 46
Whiteside, D. T., 296-7
Whitman, C. O., 34, 332
Whitman, Walt, 5, 251, 252 *et passim*
Whittet, T. D., 179
Wiggam, A. E., 158, 169, 170
Wightman, W. P. D., 206, 390-2
Wilan, 307
Wilder, Alexander, 246*n*
Wilder, R. M., 365*n*
Wiley, H. W., 355
Wilkins, John, 103, 345
Willcox, Charles, 363*n*
Willcox, Walter, 338*n*, 347*n*
Willey, Basil, 265*n*
William III, 10, 15, 17
Williams, W. C., 185
Willius, F. A., 203
Wilson, C. T., 161*n*
Wilson, G. S., 273*n*
Wilson, James, 379
Wilson, L. G., 399
Wimmer, 138, 144
Wing, D. G., 184
Winslow, C.-E. A., 151
Wishart, M. B., 365*n*
Withering, 185
Wolf, J. C., 292
Wolf, J. H., 315
Wolstenholme, G. E., 87-8
Wood, 186
Wood, Anthony à, 340*n*
Woods, H. M., 172*n*
Woolf, D. J., 206
Wren, *Sir* Christopher, 8, 103
Wright, A. D., 295

Xenophanes, 389

Yaḥyā b. al-Biṭrīq al-Rūmī, 373
Yacqūb b. Isḥāq al-Kudī, 373, 374
Yārbuqā al-Nabaṭī al-Kasdānī al-Fuqāi, 370
Yonge, James, 205
Young, John, 292
Young, J. H., 304-5
Young, J. Z., 295

Zeitlin, Jacob, 294
Zeller, 388
Zeydel, E. H., 352
Zilboorg, Gregory, 152, 154, 220*n*
Zinsser, Hans, 185
Zollinger, R. M., 314
Zuntz, 331
Zwingli, 229

Journal of the History of Medicine

and Allied Sciences

THE UNIVERSITY OF MICHIGAN
DEC 10 1963
MEDICAL LIBRARY

A Quarterly

VOLUME XVIII NUMBER 4 OCTOBER 1963

PUBLISHER: JOURNAL OF THE HISTORY OF MEDICINE
AND ALLIED SCIENCES, INC.

Published Quarterly from the
Department of the History of Science and Medicine
Yale University, New Haven, Connecticut

BOARD OF EDITORS

THOMAS R. FORBES, *Editor*

MADELINE E. STANTON, *Assistant Editor*

ELIZABETH H. THOMSON, *Assistant Editor*

DOROTHY M. SCHULLIAN, *Editor,* Notes and Events

ERWIN H. ACKERKNECHT
WHITFIELD J. BELL, JR.
EDWIN S. CLARKE
LESTER S. KING
GENEVIEVE MILLER
F. N. L. POYNTER
FRED B. ROGERS
GEORGE ROSEN
LLOYD G. STEVENSON
WARNER L. WELLS

LEONARD G. WILSON

STUDENT EDITORS

WILLIAM A. ALONSO
MILLARD J. AMDUR
FRANK C. BELL
BENEDICT BROOKS III
EUGENE P. CASSIDY
DONALD J. COHEN
ROBERT I. FINKEL
PETER D. GIBBONS
FRANK J. GRADY
JOHN B. HOWARD
DAVID P. JOHNSON
MARTIN J. KLIGERMAN
DAVID J. KUPFERSTEIN
DAVID B. LEOF
ROBERT W. LYONS
ALAN H. MORRIS
LINDA O. MOURELATOS
DIANE K. SHRIER
JOHN F. SCHILKE
GARY L. TOWNSEND

Published quarterly (January, April, July, and October) by the Journal of the History of Medicine and Allied Sciences, Inc. Publication and editorial offices are at 333 Cedar Street, New Haven 11, Conn. The subscription rate is $10.00 a year; $19.00 for two years $27.50 for three years; student subscriptions $5.00; single copies $3.00 except for special issues. Fulton issue (January 1962) $6.00.

Claims for Lost Copies. Claims for copies lost in the mail must be received within *thirty* (domestic) or *ninety* (foreign) days of the date of issue to be replaced free of charge. Changes of address must be received at least two weeks in advance of issue.

Entered as second class matter at the Post Office at New Haven, Conn., 14 February 1952 under the Act of March 3, 1879.

JOURNAL OF THE HISTORY OF MEDICINE AND ALLIED SCIENCES

Volume XVIII *October 1963* *Number 4*

JACQUES LOEB: THE MAN AND HIS TROPISM THEORY OF ANIMAL CONDUCT, *Arnold E. S. Gussin* 321

JOHN GRAUNT, FRANCIS BACON, AND THE ROYAL SOCIETY: THE RECEPTION OF STATISTICS, *Robert Kargon* 337

PODAGRA BY GOTTFRIED ROGG: AN ILLUSTRATED ENCOMIUM ON GOUT, *Thomas G. Benedek and Gerald P. Rodnan* 349

A PROHIBITION PROBLEM: LIQUOR AS MEDICINE 1920-1933, *Bartlett C. Jones* 353

IBN al-WAḤSHĪYA'S "BOOK OF POISONS," *KITAB al-SUMUM*: STUDIES IN THE HISTORY OF ARABIC PHARMACOLOGY II, *Martin Levey* 370

THE DENTIST, *J.B.H.* 378

NOTES AND EVENTS 379

Kenneth F. Russell: George Lindsay's Microscope; *Arthur L. Benton and Robert J. Joynt:* Three Pioneers in the Study of Aphasia; *William Brockbank and Andrew B. Scott:* Peonies, 'Peckers, and Prolapsus Ani; *May G. Hardy and Richard J. Durling:* Baumgartner-Fulton 5: A Corrigendum; Maccabaean Prize and Medal; Dutch Society for the History of Medicine; Dr. George Rosen Appointed Visiting Professor at Yale; American Association for the History of Medicine

BOOK REVIEWS 387

Richard Hunter and Ida Macalpine. *Three Hundred Years of Psychiatry 1535-1860.* Reviewed by Eric T. Carlson 387

W. K. C. Guthrie. *A History of Greek Philosophy,* Vol. 1. Reviewed by Jerry Stannard 388

W. P. D. Wightman. *Science and the Renaissance.* Reviewed by Allen G. Debus 390

Francisco Guerra. *Nicolas Bautista Monardes: Su vida y su obra.* Reviewed by Thomas Herndon 392

Bruno Kisch. *Gewichte- und Waagemacher im Alten Köln (16.-19. Jahrhundert)*. Reviewed by Curt Proskauer 393

Akos Palla *et al.*, Eds. *Nymphis Medicis*. Reviewed by Edwin Clarke 394

Vicente Peset. *La Psiquiatría de un Medico humanista: (Francisco Valles, 1524-1592)*. Reviewed by F. Guerra 394

Manfred Frey. *Friedrich Miescher-His und sein Beitrag zur Histopathologie des Knochens*. Reviewed by Lowell E. Noland . . 395

Allen O. Whipple. *The Story of Wound Healing and Wound Repair*. Reviewed by Edwin Clarke 396

L. R. Lind. *Aldrovandi on Chickens*. Reviewed by Margaret T. May 396

T. Doby. *Discoverers of Blood Circulation. From Aristotle to the Times of Da Vinci and Harvey*. Reviewed by Edwin Clarke . . 499

BOOKS RECEIVED 400

NOTES ON CONTRIBUTORS 401

INDEX 403

Printed in the United States of America by the Van Dyck Printing Company
New Haven, Connecticut

The Board of Managers of the Journal of the History of Medicine and Allied Sciences, Inc. announces that Lloyd Grenfell Stevenson, M.D., Ph.D., formerly Dean of the Medical Faculty and Professor of the History of Medicine at McGill University, who has accepted the chair of the History of Medicine at Yale University, has been appointed Editor of the *Journal* and will assume his responsibilities with the next volume. He has served on the Editorial Board since 1949.

Dr. Thomas R. Forbes, Professor of Anatomy and Associate Dean of the Yale University School of Medicine, who has, in addition to his many other duties, served the *Journal* as Editor most generously and faithfully since the death of Dr. John Fulton in May of 1960, will remain on the Board of which he has been a member since 1956.

The Board of Managers is happy to report further that Lester Snow King, M.D., has accepted appointment to the Editorial Board. Dr. King, who received both his A.B. and M.D. degrees from Harvard and who has done graduate work in history, is presently a member of the editorial staff of *The Journal of the American Medical Association* and Clinical Professor of Pathology at the University of Illinois College of Medicine. He is well known to medical historians as the author of *The Medical World of the Eighteenth Century* (1958) and *The Growth of Medical Thought* (1963) and as a frequent contributor to this *Journal*.

Copyright 1963 by JOURNAL OF THE HISTORY OF MEDICINE AND ALLIED SCIENCES, Inc.

FRANCIS RANDOLPH PACKARD

HISTORY OF MEDICINE IN THE UNITED STATES

ORIGINAL EDITION 1931 — REPRINT 1963 $25.00

This is an authoritative source-book of the history of medicine in the United States.

STECHERT - HAFNER, Inc.

The World's Leading International Booksellers

31 EAST 10th STREET, NEW YORK 3, N. Y.

Medical Books

Prints Manuscripts
Portraits

OLD, RARE, & OUT-OF-PRINT

America's Largest Stock

A vast stock, fully catalogued and classified, American and European, dating from *XV - XX* Centuries, particularly classical and unusual works, with emphasis upon history, biography, and specialized medicine. Lists issued in all fields of medicine. Permanent back-order files maintained.

ARGOSY BOOK STORES
114 E. 59th St., N.Y. 22, N.Y. PL 3-4455

Specialists in
Old Rare Out-of-Print

MEDICINE

as recorded in

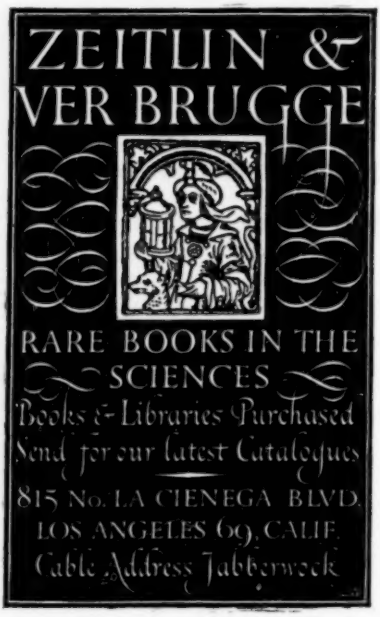
Books — Pamphlets
Manuscripts — Portraits
Engravings — Instruments

Catalogues Issued

Old Hickory Bookshop

BRINKLOW, MARYLAND
(20 miles equidistant between Washington & Baltimore)

Telephone: SPring 4-3601



H. P. KRAUS

Rare Books
and Manuscripts

HISTORY OF MEDICINE
AND THE SCIENCES

16 EAST 46TH STREET
NEW YORK 17, N.Y. MU 7-4808

CREATIVE MINDS IN MEDICINE

Scientific, Humanistic, and Cultural Contributions by Physicians

WILLIAM CARLETON GIBSON
D. Phil. (Oxon), M.D.C.M.

Professor of the History of Medicine and Science
The University of British Columbia
Vancouver, Canada

These ten lectures—given while the author was Visiting Professor of the History of Medicine at Yale University—bring forward neglected but important chapters in the history of a great and humanizing profession.

A common denominator linking the ten essays is the creative curiosity to be found in medical graduates and undergraduates of the past . . .

- *Baron Larrey, Surgeon to Napoleon's Armies*
- *Contributions by Doctors to Social Progress*
- *Ramon y Cajal, Charles Sherrington, Ross Harrison and the Neurone Theory*
- *Pioneers of Aviation Medicine*
- *Pioneers in Localization of Function in the Brain*
- *The Study of Physical Factors in Mental Disease*
- *Some Canadian Physicians*
- *Contributions to Medical Science by General Practitioners*
- *Scientific Contributions by Medical Undergraduates*
- *Medical Contributions to Music and Literature*

April 1963 — *256 pages*
$6.75 — *1 illustration*

You'll be interested also in these new books on medical history

- ***CLASSICS IN NEUROLOGY.*** *Selected by* ***Richard Sherman Lyman,*** *formerly of Duke Univ., Durham, N.C. Edited by H. S. Burr, Yale Univ., New Haven, Conn.* April '63 184 pp., $6.50

- ***MODERN RADIOLOGY IN HISTORICAL PERSPECTIVE*** *by* ***Stephen B. Dewing,*** *New York Univ., New York City.* Aug. '62, 200 pp., $5.75.

- ***THE NATURAL HISTORY OF QUACKERY*** *by* ***Eric Jameson.*** July '63, 224 pp., 20 il., $5.50.

- ***AVICENNA'S POEM ON MEDICINE*** *by* ***Haven C. Krueger,*** *Wichita, Kansas.* Jan. '63, 128 pp., 6 il., $5.00.

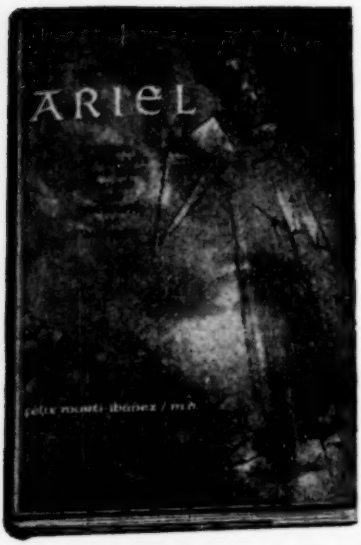
- ***A PHILOSOPHY OF INFANT FEEDING*** *by* ***Simon S. Levin,*** *Johannesburg, South Africa.* Jan. '63, 188 pp., 6 il., $7.00.

- ***HEALERS ON HORSEBACK: The Reminiscences of an English Veterinary Surgeon*** *by* ***R. H. Smythe,*** *Nottingham, England.* Jan. '63, 148 pp., $5.00.

- ***THE STORY OF WOUND HEALING AND WOUND REPAIR*** *by* ***Allen O. Whipple,*** *Columbia Univ., New York City.* March '63, 152 pp., 14 il., $5.75.

CHARLES C THOMAS • PUBLISHER
301-327 East Lawrence Avenue
Springfield • Illinois

Send for free copy of our new 1963-64 catalog of over 1500 medical and scientific books.



a new reading adventure in medicine and the arts

ARIEL

ESSAYS ON THE ARTS AND THE HISTORY AND PHILOSOPHY OF MEDICINE

by FELIX MARTI-IBAÑEZ, M. D.
Editor-in-Chief of the Medical Newsmagazine, MD; Former Professor and Chairman, Department of the History of Medicine, New York Medical College

This new collection of articles and essays traverses the vast expanse of human experience to present a fresh and exciting view of the world of medicine and the arts. ARIEL: ESSAYS ON THE ARTS AND THE HISTORY AND PHILOSOPHY OF MEDICINE combines new concepts, original observations, and imaginative thinking in a book that will give many hours of reading pleasure. One of the outstanding features of this collection of 42 essays and articles is the inclusion of the author's 13 original expanded versions of his introductions to the installments of THE EPIC OF MEDICINE, which originally appeared in the medical newsmagazine, *MD*. As a unit they provide a dramatic and cogent preface to the history of medicine. The other essays and articles in this volume cover a wide range of both historical and contemporary subjects.

ARIEL is a book for those who choose to explore the wondrous paths of the human mind. It is a book for physicians, philosophers, sociologists, educators, students—all who know the excitement of discovery and seek new ideas. 292 PAGES/CLOTH BOUND/$6.50

Partial Table of Contents

I. THROUGH THE MAGIC DOOR OF WORDS / *The Fabric and Creation of a Dream • More Magic in Words • Friends for the Road • No Books on the Ferry from Hong Kong • Tell Me a Story*
II. THE WONDER-WORLD OF SYMBOLS / *Symbols and Medicine • On An Armenian "Flying Carpet"*
III. THE MARCH OF MEDICAL HISTORY / *The Great Historical Challenges in Medicine • "That Skill That Death Loves Not" • and others*
IV. THE EPIC OF MEDICINE
V. JOURNEYS, PORTS, PEOPLES / *The Family of Man • Vast and Wide Is the World • The Restless Emerald • The Chase of the Butterfly • Those Glittering Towers • and others*
VI. LOVE, LUST, AND LETTERS / *Ars Amandi • Casanova, Then and Now • A Letter from Madame*
VII. THE MARVELS OF MAN / *The Mask and the Mirror • The Miracle Tool • The Eye and the Glance*
VIII. THE PHILOSOPHY OF MEDICINE / *Doctors Must Tell • Man, as Nature and as History*
IX. RELIGIO MEDICI *To Be a Doctor • The Young Princes • The Legacy of St. Luke*
INDEX

MD PUBLICATIONS, INC.
30 East Sixtieth Street, New York 22, N. Y.

Please send me.....copies of ARIEL: ESSAYS ON THE ARTS AND THE HISTORY AND PHILOSOPHY OF MEDICINE *by Félix Martí-Ibáñez, M.D.* *@ $6.50*

..... ☐ *check enclosed*
NAME
..... ☐ *bill me*
ADDRESS
..... *(If payment is enclosed, we pay postage.)*
CITY ZONE STATE

MD PUBLICATIONS, INC. / NEW YORK

A New Reprint *Available Spring 1964*

INDEX CATALOGUE of the Library of the SURGEON GENERAL'S OFFICE

(U. S. Army Medical Library)

SERIES 1-4, 1880-1955
Cloth bound set in 58 volumes $2,000.00

SERIES 1
Volumes 1-16, 1880-1895
Cloth bound set 560.00
Single volumes, cloth bound 35.00

SERIES 2
Volumes 1-21, 1896-1916
Cloth bound set 735.00
Single volumes, cloth bound 35.00

SERIES 3
Volumes 1-10, 1917/18-1932
Cloth bound set 350.00
Single volumes, cloth bound 35.00

SERIES 4
Volumes 1-11, 1936-1955
Cloth bound set 370.00
Single volumes, cloth bound 35.00

SPECIAL OFFER

10% discount on all orders received prior to December 31, 1963

Johnson Reprint Corporation
111 Fifth Avenue, New York 3, N. Y.
Johnson Reprint Company, Ltd.
Berkeley Square House, London W.1. England

AUTHORS AND PUBLISHERS

Scope. The JOURNAL OF THE HISTORY OF MEDICINE AND ALLIED SCIENCES publishes work relating to all aspects of the history of medicine, public health, dentistry, nursing, pharmacy, veterinary medicine, and the various sciences that impinge on medicine.

Preparation of Manuscripts

Manuscripts for publication should be addressed to Dr. Lloyd G. Stevenson, Editor, 333 Cedar Street, New Haven 11, Connecticut. They should be typewritten in double space on paper 8½ by 11 inches in size, with quoted material also typed in double space but indented five characters

References. Literature cited should be arranged alphabetically by author and typewritten in *double space.* Each reference should contain name(s) or initial(s) of author(s) and full title of paper or work. Journal articles should also include name of journal, year, volume number, and complete pagination in that order. Abbreviations of journal citations should conform to the style used in *World List of Scientific Periodicals Published in the Years 1900-1950* (3d ed., Butterworths Scientific Publications, 1952). With books, the city of origin, publisher, date, and full pagination should be given. Examples of each type of reference follow:

Holmes, William. The repair of nerves by suture. *J. Hist. Med.*, 1951, *6*, 41-63.

Franklin, K. J. *A short history of physiology.* London, Staples Press, 1949. 147 pp.

Footnotes. Footnotes should be typewritten in double space either at the bottom of each page or on separate pages at the end of the text. They should be cited in the text by superior numerals with sequential Arabic enumeration (1, 2, 3, etc.). The form of citation should follow that given under references.

Illustrations. Two pages of illustrations are allowed without charge. The page size is 4½ by 8 inches, but space must be left for legends. Sharp glossy prints are requested; photostats are not acceptable. Legends should be typed on a separate sheet in double space.

Costs chargeable to Authors. Authors will be charged for additional illustrations. Estimates will be submitted upon request.

Some proportion of the added costs for an unusual amount of quoted material or footnotes may be charged to the author who will be warned of this fact when a MS. is accepted.

Any corrections in galley proof will be charged to the author.

Reprints. Reprints may be ordered by authors or institutions at the rates given on the forms attached to galley proofs. Reprint orders must be sent with the corrected galley proofs.

• • • • • • •

Books for Review. These should be sent to the Editorial Office at 333 Cedar Street, New Haven, Connecticut 06510.

CONTENTS

VOLUME XVIII NUMBER 4 OCTOBER 1963

JACQUES LOEB AND HIS TROPISM THEORY, *Arnold E. S. Gussin* 321

JOHN GRAUNT, BACON, AND STATISTICS, *Robert H. Kargon* 337

GOTTFRIED ROGG'S ENCOMIUM ON GOUT, *Thomas G. Benedek and Gerald P. Rodnan* 349

A PROHIBITION PROBLEM: LIQUOR AS MEDICINE, *Bartlett C. Jones* 353

IBN WAHSHĪYA'S "BOOK OF POISONS," *Martin Levey* . 370

THE DENTIST, *J.B.H.* 378

NOTES AND EVENTS 379

BOOK REVIEWS 387

INDEX TO VOLUME XVIII 403

3931